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MOLLUSK SURVEY OF PELICAN BUTTE, WINEMA NATIONAL FOREST

1999 DRAFT REPORT

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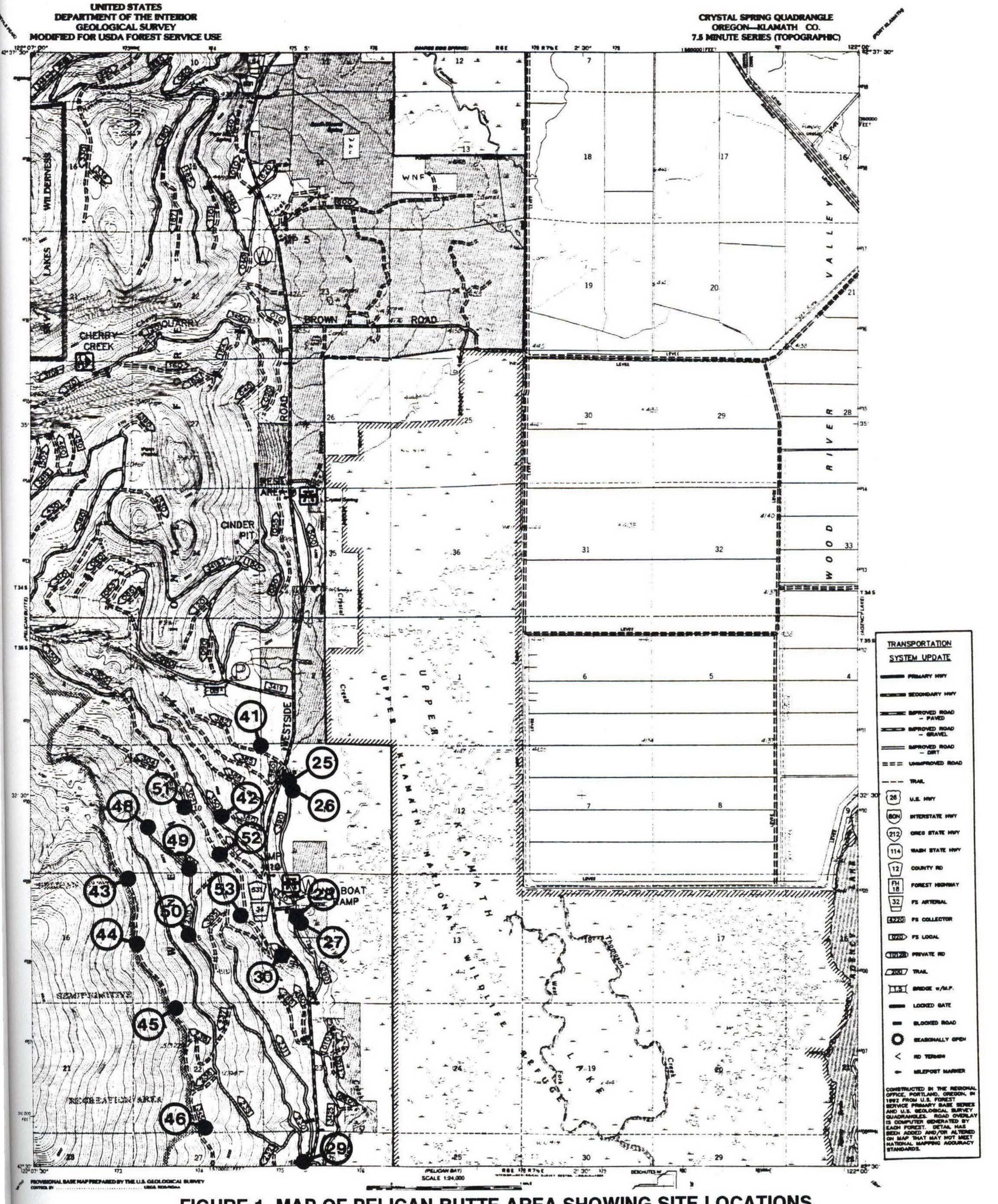
MOLLUSK SURVEY OF PELICAN BUTTE

INTRODUCTION

As part of the process of accumulation of background information needed to evaluate the proposed Pelican Butte ski resort, we were asked to survey for land and freshwater mollusks on the east side of the Butte and prepare a report on that subject. At the same time we were independently retained to evaluate terrestrial mollusks of other portions of Winema National Forest. In addition, we have for some time been engaged in a survey of freshwater mollusks of the Upper Klamath Lake drainage. The last report for this project was completed in 1998 (Frest & Johannes, 1998a). The first report on other sites in the Winema National Forest will be completed in the near future and will include these sites. However, it was thought useful to complete an independent draft report devoted solely to Pelican Butte sites in as timely a manner as possible.

Hence the current report, which covers 19 terrestrial sites surveyed in June and October, 1998. We anticipate return visits to these sites and additions to them in spring of 1999. Site descriptions are given in **APPENDIX A**. A map of site locations, using a Winema National Forest atlas map as baseline, constitutes Figure 1. Our results are discussed separately below. Each species found is included in the **SPECIES DISCUSSIONS** sections, even if common. Special attention is given to ROD (Record of Decision) taxa (ROD, 1994); but all taxa are covered.

As background, we strongly suggest reading of our previous survey report on southwestern Oregon (Rogue/Umpqua survey; Frest & Johannes, 1999b). This provides extensive and up-to-date background information on the region's geologic and biogeographic history, as well as extensive information on the taxonomy, ecology, and faunal history of the western US in general and of southwestern Oregon in particular. Some familiarity with that report will be assumed here. Briefly, this area, including Pelican Butte, is situated in an unusual position on the east side of the Cascade Range. Normally, the eastern side of Oregon is part of the extensive Washingtonian molluscan Province, which means that a characteristic suite of genera, including *Microphysula* and *Oreohelix*, should be expected here. On the west side, the remainder of Oregon is a part of the Oregonian and the recently defined Klamath molluscan provinces. Most of western Cascades-Coast Range Oregon should be in the Oregonian Province, with dominant genera *Monadenia* and *Vespericola*, specifically *Monadenia (Monadenia) fidelis fidelis* and *Vespericola columbianus*.


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
MODIFIED FOR USDA FOREST SERVICE USE
CRYSTAL SPRING QUADRANGLE
OREGON—KLAMATH CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)
WILDERNESS
LAKES
CHERRY CREEK
QUARRY
BROWN ROAD
WNF
REST AREA
CINDER PIT
WESTSIDE ROAD
BOAT RAMP
UPPER KLAMATH NATIONAL WILDLIFE REFUGE
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TRANSPORTATION SYSTEM UPDATE
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SECONDARY HWY
IMPROVED ROAD - PAVED
IMPROVED ROAD - GRAVEL
IMPROVED ROAD - DIRT
UNIMPROVED ROAD
TRAIL
U.S. HWY
INTERSTATE HWY
OREG STATE HWY
WASH STATE HWY
COUNTY RD
FOREST HIGHWAY
FS ARTERIAL
FS COLLECTOR
FS LOCAL
PRIVATE RD
TRAIL
BRIDGE w/M.P.
LOCKED GATE
BLOCKED ROAD
SEASONALLY OPEN
RD TERMINI
MILEPOST MARKER
CONSTRUCTED IN THE REGIONAL OFFICE, PORTLAND, OREGON, IN 1992 FROM U.S. FOREST SERVICE PRIMARY BASE SERIES AND U.S. GEOLOGICAL SURVEY QUADRANGLES. ROAD OVERLAY IS COMPUTER GENERATED BY EACH FOREST. DETAIL HAS BEEN ADDED AND/OR ALTERED ON MAP THAT MAY NOT MEET NATIONAL MAPPING ACCURACY STANDARDS.
SCALE 1:24,000
PROVISIONAL BASE MAP PREPARED BY THE U.S. GEOLOGICAL SURVEY

FIGURE 1. MAP OF PELICAN BUTTE AREA SHOWING SITE LOCATIONS.

In the Klamath Province, there is a series of short-ranged species belonging to these two genera and the typical species are absent. The normal boundaries of the Klamath Province are much like those of the Klamath-Siskiyou Bioregion (e.g., see DellaSala et al., in press); that is, covering the Klamath and Siskiyou Mountains in the loose sense, from the Umpqua or Rogue River, Oregon, south to the Upper Sacramento-Pit, lower-middle Klamath, and Trinity river drainage systems, California; in short, much like Franklin & Dyrness' (1988) Klamath Mountains physiographic province. Note that this would exclude the Upper Klamath drainage (entirely situated east of the Cascades) according to most evaluations of faunal affinities. However, on occasion, *Monadenia* and *Vespericola* do manage to penetrate the Cascades. The other famous instance is the Columbia Gorge of Washington and Oregon (see Frest & Johannes, 1995a, in press, for discussion); but the Upper Klamath provides another, equally striking example. Here the dominant land snails are taxa more at home typically on the west side of the Cascades at the generic level and strict endemics at the species level. These taxa have mostly been discovered only in the last few years, so unexpected were they. Thus, the dominants locally are more typical of the Oregonian or Klamath province; the rest of the terrestrial fauna shows clear and typical Washingtonian affiliations, including some quite common and widespread taxa. But the level of endemism remains high; and is especially notable when provincial dominants are considered.

METHODS

Standard methods in malacology were used to prosecute this survey. For details, see Frest & Johannes (1999b). In addition, we followed the late October release of the Forest Service-BLM mollusk survey protocols, which require and define such matters as definition of suitable habitat and number of site visits. In some cases, two site visits are necessary: the second such will be conducted in spring of 1999. As per preliminary discussions and the protocol, we concentrated our sites in areas that were effectively riparian or that had talus accumulation. We were provided by Winema National Forest with a detailed, large-scale project base map that delineated 1) the project area; 2) areas known to qualify as riparian or as rock talus within the project area. We has also looked over the area previously, both as a consequence of our earlier aquatic mollusk work and as part of a more general survey of the Winema National Forest for terrestrial mollusks (the draft report of this survey is now in preparation). Our previous experience was used in some cases to define potential mollusk habitat. Sites were located on the large scale map and on the appropriate USGS 7.5' topographic map.

In general, hand collection methods were preferred; however, in rare cases this was complemented by litter sampling. Because new or rare taxa were potentially involved, we saved all mollusks collected, including common taxa, and properly preserved some material for later study of anatomy. For faunal lists, see Table 1; for locality descriptions, see **APPENDIX A**. Taxa found are discussed in context immediately below. For overall results to date, see **RESULTS** section below.

SPECIES DISCUSSIONS

INTRODUCTION

Species-level taxonomy used here largely follows Pilsbry (1939-48) for land snails, except where superseded by more recent works. Examples include the papers of B. Roth and his collaborators in California and Oregon (mostly referenced by species below: see also Roth, 1993, 1996a) and the works of W. B. Miller, G. Webb (mostly published in *Gastropodia*), S. S. Berry, and Allyn Smith. Higher taxonomy also is often that of Pilsbry (*op. cit.*), with some later modifications: we follow Burch & Pearce (1990) in preference to Vaught (1989). It should be emphasized that higher taxonomy of land snails is currently in flux: and some of this uncertainty impacts directly on NW major groups (see, *e.g.*, Emberton *et al.*, 1990; Bieler, 1993; Roth, 1996b, 1997; Cuezzo, 1998). For freshwater mollusks, we generally follow Burch (1989) in preference to Vaught (1989); but in some significant cases, we follow Taylor (especially 1981) rather than Burch (1989). Hydrobiid taxonomy is that of Hershler and others (see **REFERENCES**: especially significant are Ponder & Warén (1988) and Hershler (1994; 1998)). For comparison of hydrobiid taxonomy of Vaught (1989) with that of others (and substantive reasons for rejecting the former), see Kabat & Hershler (1993). Fundamentally, the Vaught classification is a literature cull of varying thoroughness. Major monographic revisions by lifetime specialists, *e.g.,* Riedel (1980) and Ponder & Warén (1988), are not reflected in it, and treatment of some families is fraught with errors (see, *e.g.*, Kabat & Hershler, 1993, p. 59-60).

Information on some taxa newly discovered over the past few years is included in Frest & Johannes (1991b, 1993c, 1993e-f, 1994, 1995a-d, 1996a-b, 1997a, 1998a). Common names for species are those recognized by Turgeon *et al.* (1988, 1998) wherever possible. Roth (1993: see also references therein for earlier papers), Roth & Miller (1992, 1993, 1995), and Frest & Johannes (1993c, 1996a, b) have added or suggested later names for some land and freshwater gastropods. New coinages herein are for undescribed taxa, missed species, subspecies, or taxa described subsequent to publication of Turgeon *et al.* (1988, 1998) and not named by others. Wherever practical we follow the guidelines of Turgeon *et al.* (1988, 1998). Note that many valid species (and most subspecies) were either overlooked or not considered for various reasons by Turgeon *et al.* (1988). Especially weak areas are western land snails and Hydrobiidae. Subgenera are not included, and subspecies were incorporated for just a few marine taxa. A revised edition was published in 1998 (Turgeon *et al.*, 1998); this also excludes subspecies, but does include a few subgenera.

In order to keep this document at a reasonable length, complete taxonomy and illustrations are not given here. However, brief descriptions of new taxa are included to help demonstrate taxonomic validity and aid in field recognition. When possible, reference is made to a more comprehensive description and to recent, relatively high-quality illustrations. Our descriptions generally feature characters that can be recognized in the field, or with nothing more complex than a hand lens. It should be recognized explicitly that soft-anatomy at the very least provides many more characters and is absolutely necessary for many taxa, such as freshwater snails in the Hydrobiidae (over half the freshwater taxa discussed below) or land snails in the Succineidae. Technical terminology is deliberately kept to a minimum here. For basic land snail terminology, we suggest consultation with such works as Burch (1962) and Burch & Pearce (1990); for freshwater snails, the glossary in Burch (1989) is very helpful. The manuals by Burch (1972, 1973, 1975a, b) are good introductions to the terminology for fingernail clams and larger bivalves. Terminology for mollusk habitat also includes some unique or uncommon terms, or special usages: for these and for basic morphological terms, consult the **GLOSSARY** preceding the **REFERENCES**.

Because of the local focus and need for detailed information, we do here include detailed descriptions of known sites in **APPENDIX A**. Some sites for ROD species are included in Frest & Johannes (1996a) or can be gotten from the Pacific Northwest Ecosystems Office (Portland, Oregon) mollusk database. We do (in some cases, particularly when species had commercial value, were showy, new, or restricted to one or two sites) feel it possible that publication of detailed locality information could jeopardize species' survival, so suggest care in distribution of this publication.

Time and space also do not permit more than summary discussion of ecology, associates, or current threats, except in a few specific instances. Such information is supplied in brief for all taxa, however. It should be assumed that threats referred to in each entry are current and have been recently (within the last 1-6 years; often within the last 2 years or less) checked in the field by us or others to confirm currency and accuracy. We have attempted to visit type and other significant localities for all taxa involved, and have done so for nearly all (exceptions are specifically mentioned below). We also made a point of examining museum material (generally including type specimens) for all taxa listed in this section. In most cases, we have also collected and preserved topotype or near topotype material for all taxa dealt with in detail.

Similar length considerations have not allowed complete literature citations for each taxon. We have emphasized only major works which represent the current taxonomic consensus; references to others will be found therein. One absence requires comment. We have not dealt with the polygyrid revisions of Vagvolgyi (1968) to any appreciable extent. These were based solely on a few shell features and rather cursory morphometrics. Museum material for *Cryptomastix* typically is comparatively sparse; lacks juvenile features; and has been cleaned, removing periostracal hair in almost all cases. Vagvolgyi's revisions were based mostly upon MCZ collections, which are somewhat limited for *Cryptomastix* (much less so for eastern US polygyrids). Even so, it is instructive to compare the rather spare taxonomic treatment of eastern North American *Triodopsis* by Vagvolgyi (1968) with the richly speciose approach of Hubricht (see Hubricht, 1985 for summary and references). This was done recently in an exceptional work which will remain standard for many years. Emberton (1988) used shell, anatomic, and allozyme features to thoroughly revise eastern *Triodopsis* (*s.s.*). Hubricht's approach was vindicated, essentially *in toto*. A later work (Emberton, 1991) reached the same results for the closely related tribe Mesodontini; the summary paper (Emberton, 1995a) compares and contrasts polygyrid phylogenies in detail. Emberton, like nearly all modern workers, considers western North American "*Triodopsis*" (*s.l.*) as mostly belonging to different genera, specifically *Cryptomastix*; but Emberton's (1988) comments on Vagvolgyi's taxonomy are pertinent here also. Another difficulty with the latter's work is the lack of field experience with the animals involved; such elementary errors as terming the Idaho Salmon River a "small tributary of the Snake" would have been avoided easily. Similarly, correlation (or at least some mention) of substrate, geologic history, and co-occurring genera (notably *Oreohelix*) with *Cryptomastix* occurrences might also have been useful. See Frest & Johannes (1995b) for such information. Our own collections of *Cryptomastix* are in any case often much larger than those available elsewhere.

We have carefully reviewed virtually the entire published and much unpublished literature on ICB-Pacific Coast mollusks. Only those taxa are treated for which there exists general consensus or solid, recently collected evidence for validity. In some cases, this has led to the treatment of undescribed forms. This was done for those groups which are widely accepted to be of conservation significance and for which we both have considerable recent collections and have reviewed museum material as well. This practice is becoming common (see, *e.g.*, Solem & Climo, 1985; Emberton, 1996), in part because the quickening pace of human habitat modification requires some notice be taken of such forms if they are to have any chance of survival. However, even this procedure has resulted in the exclusion of many forms which will probably prove valid taxa with further study; but a conservative approach was deemed most appropriate. We have comparatively limited experience with Physidae, Planorbidae, and Lymnaeidae among freshwater forms and Succineidae among land snails; hence, our treatment of these families is especially conservative.

Institutions whose type and other collections either 1) have been examined for taxa dealt with in this project; 2) are referred to specifically in the species entries; or 3) both of the above are listed below. Collection abbreviations are those of Leviton *et al.* (1985) wherever possible. Most of our collection visits were made in 1985, 1991, and 1995. Further such work was be conducted in 1998.

AMNH	American Museum of Natural History, New York
ANSP	Academy of Natural Sciences of Philadelphia

BMNH	British Museum of Natural History, London
CAS	California Academy of Sciences, San Francisco
CHAS	Chicago Academy of Sciences, Chicago
Deixis	Deixis collection, Seattle
DMNH	Delaware Museum of Natural History, Wilmington
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge
NMC	National Museums of Canada, Museum of Natural History, Ottawa
FMNH	Field Museum of Natural History, Chicago
LACM	Los Angeles County Museum, Los Angeles
Miller	W. B. Miller collection, now mostly in SBMNH; specimens preceded by WBM
Roth	Barry Roth collection, San Francisco; specimens preceded by BR
SBMNH	Santa Barbara Museum of Natural History, Santa Barbara
SDNHM	San Diego [Society of Natural History] Natural History Museum, San Diego; also abbreviated SDSNH
Smith	Allyn Smith collection; now partly in CAS; specimens preceded by AGS
SSB	S. Stillman Berry collection, Redlands, California; much now in CAS and SBMNH; specimens preceded by SSB
UCM	University of Colorado Museum, Boulder
UF	Florida Museum of Natural History, Gainsville
UI	University of Illinois, Museum of Natural History, Champaign-Urbana
UMMZ	University of Michigan Museum of Zoology, Ann Arbor
USNM	Smithsonian Institution, National Museum of Natural History (NMNH); formerly U. S. National Museum.

Taxa are listed alphabetically within major subheadings, rather than taxonomically, to facilitate location and indexing. Thus, nominate subgenera may not be the first discussed; and new taxa (forms known to be distinct but not formally described) are treated similarly, largely because placement of new subspecies would be problematic if other arrangements were followed. The large number of undescribed forms dealt with will not be surprising to any one who has studied the western US fauna in any detail, or is familiar with current taxonomic practice. It does not represent, *i.e.*, any particular bias on our part toward "splitting", rather than "lumping". There has been considerable work done on western US land and freshwater mollusks; but much more remains to be done. In recent years, there have been relatively few malacologists interested in systematics of western US forms (Hershler & Roth, 1996), and many species have lain unworked in the major natural history museum collections, in some cases for as long as a hundred years. Early taxonomy in some instances undoubtedly oversplit some genera (*e.g.*, Gould &

Woodruff, 1986, Woodruff, 1988 on *Cerion*); but examples of overly speciose western US genera are rather sparse: neglect or over-conservatism is closer to the norm.

Access difficulties and lack of sufficiently-trained workers, rather than lack of interest, are sometimes the problems, even in areas long known to be exceptional. An example is the lower Salmon River-Hells Canyon area of western Idaho and eastern Oregon. Even though it has been famous for high land snail diversity since the 1860s; and despite the fact that many malacologists have worked it, species continue to be found in recent times (*e.g.,* Solem, 1975; Fairbanks, 1984; Frest & Johannes, 1995a). In this instance, more careful and complete modern reworking of older taxa has led to an increase in the number of full species and total diversity, as well as the prediction that yet more species remained to be discovered (Solem & Clarke, 1974; Solem, 1975), a prediction well borne out in Frest & Johannes (1995a). One other example should be cited. Careful work and extensive collection has recently led to considerable increase in the number of species in the polygyrinid genus *Vespericola*, as well as one new genus (see Roth, 1993; Roth & Miller, 1992, 1993, 1995; Cordero & Miller, 1995); and many more species (and some higher taxa) remain to be described.

A similar example for western US freshwater mollusks has recently been discussed by Frest (1995). As late as 1989, the hydrobiid snail genus *Pyrgulopsis* had only five accepted species. With previously known forms allocated elsewhere added, it still comprised only some 26 taxa in the last comprehensive compilation (Burch, 1989). Due to sustained efforts by the NMNH's R. Hershler since 1985, the latest review of the genus (Hershler, 1994) listed 65 taxa, including some 32 species described since 1985. Eight were described subsequently (Hershler, 1995a; Thompson, 1968). It is likely that at least 65 western US *Pyrgulopsis* remain to be described (Kabat & Hershler, 1993; Frest, 1995). Hershler (1998) added an additional 58 taxa from Nevada and Utah, bringing the described total to 131. As noted in previous sections, diversity in both land and freshwater forms is concentrated in only a few genera. Such dramatic diversity increases will likely prove exceptional for the fauna as a whole. Nevertheless, the extent and scientific importance of such species clusters should not be underestimated.

The pace of environmental and habitat change in the western US has been so rapid as to outstrip the systematic efforts of taxonomists. As much as in tropical rain forests, there is every reason to believe that many species have already or will go extinct before discovery or description. Again, the premier example is provided by the Hydrobiidae. Of the 65 described *Pyrgulopsis*, over half are currently either extinct, federally listed species, or were until recently listing candidates (Hershler, 1994). Of the 49 western hydrobiid species until recently listed as candidates (USFWS, 1994), 40 were described in the last ten years. Of the 58 *Pyrgulopsis* taxa described this year past, at least 2 are already extinct (Hershler, 1998).

Such considerations may explain further why we choose to deal with undescribed forms here. Exclusion of such would result in very considerable underestimation of both the potential and known regional malacofauna. Hence, undescribed taxa are covered here, as far as present knowledge allows. It should be emphasized again that only those forms for which we have adequate range and taxonomic data available are so treated; *i.e.* taxonomically valid forms known to be currently exceptionally rare and in clear danger of extinction. Some other undescribed taxa are known to be widespread and comparatively secure; these are for the most part excluded from consideration, unless habitat limitations, occurrence, or special circumstances indicate that they will soon be in actual danger of extinction.

The status suggestions made below are based upon a variety of criteria. We have been involved with mollusk listings under the ESA since about 1980; prepared National Recovery Plans and status reports for USFWS (*e.g.*, Frest, 1984, 1991); and have written reports to be directly used by USFWS to prepare status reports on certain mollusk species (*e.g.*, Frest & Johannes, 1991c, 1993d). We regularly review Proposed and Final Rules for mollusk species under the Act; and regularly examine available rules and procedures, as published in the Federal Register and as made available by USFWS. Similarly, we have provided the basic mollusk lists and background data for both the Clinton Forest Plan assessment areas (NSO: Frest & Johannes, 1991b, 1993c, 1996a; Roth, 1993, 1996: ICB, Frest & Johannes, 1995a). In general, taxa suggested as Endangered below are regarded as in imminent danger of extinction. Such taxa have relatively few sites known to survive currently; have had much or all of their range surveyed recently; have suffered extensive site and habitat loss in recent years; have had the majority of their habitat lost in historic times; have obvious and clearly definable threats to remaining sites; are known to have suffered considerable population loss in recent years; and are by consensus of informed malacologists valid taxa. Almost all of these taxa are also known to occur mostly or entirely on public lands (Table 3). Taxa suggested as Threatened below are regarded as in definite danger of extinction. Such taxa have relatively few sites known to survive currently; have had much or all of their range surveyed recently; have suffered considerable site and habitat loss in recent years; have had the majority of their habitat lost in historic times; have obvious and clearly definable threats to remaining sites; are known to have suffered major population loss in recent years; and are, by consensus of informed malacologists, valid taxa. Almost all of these taxa are also known to occur on public lands (see Table 3 of Frest & Johannes, in press).

Suggested listing status is individualized to reflect site condition, population size, likelihood of future site loss, likelihood and nature and effects of threats to remaining sites. Recommendations are thus not completely formulaic despite following a standard format, but represent a synthesis of a variety of factors. Among others considered are the following: proximity to expanding urban areas; occurrence in or near active mining areas; occurrence in areas with valuable material commodities likely to be exploited in the future; ownership (state or federal); state or local land usage policies; accessibility; location along or near major travel corridors; geologic history and land usage history of the occurrence area; plant community; area fire history; population growth trends (where available); area irrigation, grazing, timber harvest, or other disruptive practice suitability; etc. Thus, some species with a number of known sites might be ranked as more at risk than ones with one or several; and estimated overall population size and trends were major factors influencing ranking. Similarly, state rankings are individualized to reflect each taxon's condition within that state, based on the listed factors. Where not all sites are likely to have been discovered to date, best projections are made based on total potential range *vs.* known occurrences, with adjustments made to reflect ecosystem conditions and threats in the incompletely surveyed range portion.

In making these evaluations, we pool data derived from museum collections; a thorough literature review; our own collections in the whole of the region (which involve about 4,500 formally established sites, equally divided between land and freshwater habitats, dating from 1987 to the present, as well as many others either not formally defined or located in areas peripheral to the ICB-Pacific Coast); examination of the gray literature; examination of private collections and those of other environmental consultants; and consultations with malacologists and other professionals with original data not otherwise available.

Entry format is rather standardized. Current taxonomy and common name (in or based on Turgeon *et al.*, 1988, 1998) head each, followed by data on **Type locality** and location of type specimens. We then furnish a short **Description** if none has appeared recently; or a reference to such a description and illustration, oriented toward useful field recognition features. Often, **Discussion** of similar forms, synonyms, and history follows. Reference to the appropriate key in **APPENDIX A** of Frest & Johannes (1999b) is made in this section also. Summary sections on **Ecology**, **Original distribution**, and **Current distribution** follow next. A short section specifically on **Southwestern Oregon** distribution follows. Sections of direct conservation interest succeed, discussing **Threats** to the taxon, **Criteria for its inclusion** here, and **Recommended status** vis-à-vis federal ESA, federal land management regulations (BLM, Forest Service, NPS), and relevant State(s) of occurrence' statutes or regulations. Finally, basic literature **References** are listed.

ROD TAXA

Taxa included here are those with official ROD status as of November, 1998. These include both Survey and Manage and Riparian Reserve groups; considerable overlap occurs between the two groups. For a complete table of these and their state occurrences, see Frest & Johannes (1999b). Information is also available on a National Forest or BLM unit base. In the Winema National Forest, several taxa are currently recognized as relevant. Specifically, these include the slugs *Prophysaon dubium* and *Prophysaon coeruleum* and the land snails *Vespericola sierranus* and *Pristiloma arcticum? crateris.*

Thus far, we have no evidence that either *Prophysaon dubium* or *Prophysaon coeruleum*, in the strict sense, occur in the Winema National Forest, let alone on Pelican Butte. We discuss this matter more fully in our forthcoming report to Winema NF; but a few words are appropriate here also. The Klamath tail-dropper, termed *Prophysaon* n. sp. 1 here and in Frest & Johannes (1999b, in press) has until recently been thought to be a sister species or possibly a subspecies of *Prophysaon coeruleum*. However, recent dissections by Barry Roth (pers. comm., 1998) and by us confirm that it is a full species, perhaps more distantly related to *Prophysaon coeruleum*. As far as presently known, this taxon abruptly replaces *Prophysaon coeruleum* about 2/3 of the way east across Jackson County in an approximate north-south line, cutting across both the Klamath and Upper Rogue drainages. It then continues over the crest of the Cascades into Klamath County. So far, it has not been seen more than a mile or so east of Upper Klamath Lake itself. This taxon has so far also not been collected in California, despite specific searches for it by us and by Klamath National Forest personnel in areas directly south of eastern Jackson and western Klamath counties. Moreover, short searches by us in Deschutes National Forest to the north also failed to turn up this taxon. Similarly, we have so far not found it in eastern Douglas County, where *Prophysaon coeruleum* appears to continue east almost to Crater Lake. This taxon is thus not a ROD taxon, but is a species of concern because of its apparent relatively small total range. Nevertheless, it appears to be the most common slug encountered in relatively undisturbed forest areas in the Winema, which naturally are now quite limited in extent.

Very similar considerations caused us to suggest that the Winema sideband (*Monadenia (Monadenia)* n. sp. 1) be considered a Sensitive species. This taxon has a similar range to that of the Klamath tail-dropper, except that it is so far not known to cross the Cascades crest into eastern Jackson County. Rather, in this area it appears to be replaced by the ROD taxon *Monadenia (Monadenia) fidelis celeuthia*, which incidentally appears to be closely related to this subspecies. Forest occurrences of this taxon differ in morphology from similar occurrences in talus on both sides of Upper Klamath Lake. The Lake populations appear to be more variable in size and shape; have taller spires; and have considerable color variation on the upper half of the spire. The forest populations are lower and more uniform in color on the upper spire. In view of these differences, including rather fundamentally different ecology, it is possible that two separate taxa are involved. We will attempt to address this problem in the final report; but for the moment construe this taxon broadly. In any case, we note that it occurs frequently in comparatively intact mixed conifer forest on the Winema, including Pelican Butte, but that we have seen no large populations. Most specimens have been collected around old-growth logs left from the first cutting in this area. What will happen to this taxon when such an ephemeral habitat is gone is questionable.

Vespericola n. sp. 14, the Winema hesperian, is a similar case. This taxon occurs in similar habitats to the Winema sideband and often with it. However, it does not cross the Cascades crest and does not occur either in talus sites near Upper Klamath Lake or on Pelican Butte. So far, it has been found mostly in mixed conifer stands in the vicinity of Lake of the Woods. As with the last taxon, this one is found most often in association with old growth logs and only in quite small numbers (we have no large populations). This *Vespericola* appears to be closely related to the Mount Hood hesperian, newly found in a very limited part of Mt. Hood National Forest (Frest & Johannes, in press), and to the Clearwater hesperian, recently located in a limited part of the upper North Umpqua River drainage. Note that these latter two taxa both occur only on the west side of the Cascades, at relatively high elevations, in mixed mature conifer forest (Frest & Johannes, in press). The very limited distribution of *Vespericola* n. sp. 14 and its apparent rarity at all sites have caused us to suggest Sensitive status for it. The whole lineage seems to consist of a few rare and isolated forest taxa arrayed along the Cascades axis; so far, all appear to be quite rare and limited in distribution. We have thus far been unable to do adequate dissections of any of the three species so far involved, due to scarcity of live adults. We hope to address that problem this spring.

So far, we have not found populations of *Vespericola sierranus* on Pelican Butte, even though there is some suitable spring meadow habitat in the area and populations occur a short distance to the north. However, we have now checked nearly all suitable habitat in the Pelican Butte area and feel it unlikely that colonies will be found. This same sort of spring meadow habitat has maintained colonies of *Pristiloma arcticum? crateris*, like *Vespericola sierranus* a ROD taxon, in areas to the north of Pelican Butte. So far, though, we have not found this taxon on or below Pelican Butte, either. Co-occurrence with *Vespericola sierranus* is not unusual on other parts of the Winema or near Crater Lake.

Pristiloma (Pristinopsis) arcticum? crateris Pilsbry, 1946
Crater Lake tightcoil

Type locality: One mile south of Crater Lake, Klamath County, Oregon; holotype ANSP 147788a; paratypes ANSP 147788; other paratypes should be in UCM collections; but not listed by Wu & Brandauer (1982).

Description: See Pilsbry (1946) for best description and illustration. This taxon has an adult (*ca.* 5-5 ½ whorls) diameter of about 2.75 mm. The shell is very thin, pinkish brown, glossy, and vitreous; depressed, with low conoid spire and evenly rounded periphery; whorls regular and somewhat closely coiled, except for the final, which is slightly more expanded; imperforate; columellar margin slightly expanded; aperture narrowly crescentic. *P. idahoense* is larger and has the periphery distinctly above the median portion of the whorl; the spire is generally slightly more conoid; the aperture is narrower; and there is generally ½- 1 whorl more in adults; this taxon is also yellowish hyaline in color. *P. arcticum arcticum* has a narrower profile but more convex base; a more narrowly crescentic aperture; and adults generally have 5 whorls. See key 1S (**APPENDIX C** of Frest & Johannes, 1999b) for additional comparisons.

Discussion: This is the undescribed species referred to by Henderson (1929a). Taxonomy here follows Riedel (1980). The anatomy is unknown. This taxon was referred to as *Pristiloma arcticum crateris* Pilsbry, 1946 in Frest & Johannes (1993c); and as here in Frest & Johannes (1996a, b).

Ecology: Uncertain. Related species found at high elevations live along small streams, in leaf litter in forest, near the edges of seeps or bogs, and under cushion plants in open mountain meadows. Persistence of moisture for a good part of the year is a *desideratum.* Our sites fit into this scenario: they are open, spring-fed meadows and riparian areas in comparatively open Ponderosa pine forest. This species appears to be an annual taxon which occurs in *Pinus ponderosa*-Douglas fir forest openings of two sorts: spring-fed meadows with abundant sedges and grasses, *Aconitum*, bryophytes, *Spiranthes*, *Pyrola*, *Salix*, *Allium*, *Cornus stolonifera*, and similar plants; and along mountain streams, also in open, grass- and sedge- covered, seepy areas. The elevation range is considerable, from subalpine areas near Crater Lake to the shoreline of Upper Klamath Lake. Common associates are *Prophysaon* n. sp. 1

(Klamath tail-dropper); *Deroceras laeve*; *Vespericola* cf. *sierranus*; *Punctum randolphi*; *Euconulus fulvus alaskensis*; *Zonitoides arboreus*; *Pristiloma chersinella*; *Discus whitneyi*, *Nesovitrea* sp., and *Paralaoma caputspinulae*.

Original distribution: A single site in Crater Lake National Park, Klamath County, Oregon. Likely to have been relatively widespread in middle-high elevation open Ponderosa pine forest on the east side of the Oregon Cascades, at least from Crater Lake to the California border.

Current distribution: We have recollected this taxon recently at three sites, one in Rogue River National Forest at the border with Crater Lake National Park, one in Winema National Forest, and the third (possibly on BLM lands) along Upper Klamath Lake. Occurrence in adjoining portions of Umpqua and Winema National Forests, including areas considered for protection of the Northern Spotted Owl, is possible.

Southwestern Oregon distribution: So far, this taxon has proven very rare in southwestern Oregon, with only one or two definite localities. The high elevation occurrence and spring meadow ecology are limiting factors. There are many spring meadows in the upper Rogue and Umpqua; however, most of these are badly degraded by cattle and hence often have few or no native land mollusks. Careful search of more of these may be necessary to locate additional *crateris* sites regionally. Not found in the Pelican Butte area so far, although this taxon does occur a little farther north.

Threats: Uncertain; most of the area surrounding Crater Lake National Park has been logged and is currently being grazed. Many spring meadows around Upper Klamath Lake have been channelized, diverted for irrigation, and/or are heavily grazed. See Frest & Johannes (1996a, b; 1998a; 1999, in prep.) for details.

Criteria for inclusion: Local endemic; occurrence on public lands.

Recommended status: Currently, a ROD Survey and Manage species (ROD, 1994); should be a ROD Riparian Reserve species as well. Also currently (ONHP, 1995) an Oregon Natural Heritage Program list 1 species (critically imperiled because of extreme rarity or because it is somehow especially vulnerable to extinction or extirpation, typically with 5 or fewer occurrences). It was recommended as a listing candidate by Frest & Johannes (1993c, 1996b, 1998a). At the least, it should be considered a Sensitive species by the Forest Service, BLM, and other land management and wildlife agencies. Federal and State (Oregon) listing as Threatened, as we have recommended previously, is appropriate for the reasons just cited.

References: Henderson (1929a); Pilsbry (1946); Frest & Johannes (1993c, 1996a, 1996b, 1998a); Deixis collections, 1995, 1997.

Vespericola sierranus (Berry, 1921)
Siskiyou hesperian

Type locality: Two miles north of Weed, Siskiyou County, California; holotype SSB 5087; paratype ANSP 130455.

Description: The best description and illustrations at present are those of Pilsbry (1940). We anticipate more thorough treatment sometime in the future by B. Roth. A small-sized *Vespericola* with depressed-conical to low-conical shell with about 5.5 whorls; no or very rare and scattered periostracal setae on adult; numerous very weak spiral lirae on adult; umbilicus small (moderate-sized for genus] but distinct, only small portion covered by slightly reflected lip. Shell color cinnamon red; apertural lip brown, generally thin, very slightly reflected, narrow, also slightly more reflected at columella; parietal generally absent. Last whorl deeply contracted behind the lip. Mean adult shell diameter is 8-10 mm. Embryonic whorls smooth to slightly granular (not wrinkled or distinctly granular as in typical *Vespericola*).

Discussion: There is some possibility that this species is composite: in particular, Upper Klamath Lake and California Great Basin populations have distinctive shell features. We have not yet had time to examine the anatomy of the variant populations in great detail. *Trilobopsis* n. sp. 3 is similar in size and shape; but that taxon is distinctly furry (has periostracal setae); generally slightly larger; and the body tends to be light brownish or brownish pink: in *sierranus*, the body is dark gray to black.

This taxon was first described as *Polygyra sierrana* Berry, 1921; and subsequently as *Vespericola sierrana* (Berry), Pilsbry, 1940.

Ecology: Spring seeps, deep leaf litter along stream banks, and under debris on ground (Roth, 1993). Moist valley, ravine, gorge, or talus sites are preferred, *i.e.,* low on a slope and near permanent or persistent water, but not normally subject to regular or catastrophic flooding. Persistence of moisture is a *desideratum*, and this species may occur in areas with running water or alongside streams and spring pools. It has been found on such plants as *Rorippa*, in association with other *Vespericola* species, *Prophysaon*, *Oxyloma*, and *Deroceras*. A strong notophile.

Original distribution: Broadly scattered sites in the following counties: **Oregon**: Jackson, Klamath; **California**: Siskiyou, Shasta, Plumas, Nevada, Placer, El Dorado (Roth, 1993).

Current distribution: Cited by Roth (1993) from about 17 localities. Among other areas, there are sites in Shasta and Trinity National Forest. Other localities apparently with this species are in Rogue River National Forest and on BLM lands (Medford District). Recently (1994-1997), four sites were found in Klamath County, Oregon (Upper Klamath Lake and vicinity of Crater Lake National Park). For additional recent California sites, see Frest & Johannes (1994, 1995c, 1996b, 1998a).

Southwestern Oregon distribution: Most of the known Oregon sites for this taxon are in the Klamath River drainage portions of Jackson County, a quite limited area, mostly the Jenny Creek drainage. There are literature reports from around Trail and Prospect; but these seem to pertain to another taxon, "*Trilobopsis*" n. sp. 3. The two can occupy very similar sites; and their mutual exclusivity despite adjoining ranges is notable. In the Upper Klamath Lake, area, sites found so far are in two areas: one along the west side of Upper Klamath Lake, in spring meadows associated with major springs. The second is high elevation spring meadows, such as around Crater Lake. So far, we have found no sites in or very near to Pelican Butte, although several sites occur a little farther north (see Frest & Johannes (1998a) for details.

Threats: Logging over almost the entire known range; grazing in much of the logged area; diversion and modification of springs and seeps for livestock, irrigation, and human domestic use; locally, placement of roads and human habitations in lowland and riparian zones; agricultural development and irrigation of much of the Shasta-Little Shasta and Klamath valleys. We have specifically commented on degradation of some sites due to a combination of grazing and logging in the Jenny Creek-Fall Creek drainages, Jackson County, Oregon, elsewhere.

Criteria for inclusion: Old growth and riparian associate; occurrence on public lands; inclusion in Roth's (1972) paper on California rare and endangered mollusks.

Recommended status: Currently, a ROD Riparian Reserve species (ROD, 1994). Should minimally be considered Sensitive by Forest Service, BLM, and other appropriate federal and state land management agencies; should be a ROD Survey and Manage species also. It should be considered a Sensitive species by the Forest Service, BLM, and other land management and wildlife agencies. Federal listing as Threatened is appropriate for the reasons just cited. Note extensive recent searches by Roth, Miller, and Frest & Johannes (summarized in Roth (1993) and Frest & Johannes (1995c)). It was recommended for listing by Frest & Johannes (1993c, 1994, 1995c, 1996b, 1998a).

References: Pilsbry (1940); Roth (1972, 1993); Frest & Johannes (1993c, 1994, 1995c, 1996b, 1998a); Deixis collections, 1991-1997.

OTHER SENSITIVE TAXA

Monadenia (Monadenia) n. sp. 1
Winema sideband

Type locality: None designated as yet; undescribed taxon.

Description: This comparatively small *Monadenia* species has a shell shape much like that of *Monadenia fidelis fidelis*. It is typically about 40% smaller (to 22 mm at 6 -6 ½ whorls) but has an equal- or slightly larger-sized umbilicus (proportionately much wider). The upper surface is often a dirty yellow, with coarse and irregular radial growth lines and spotty spiral striation. Banding is well-developed; the base and peripheral band are typically dark brown. For other comments on this taxon, see Roth (1981a).

There may be two forms of this taxon. The above description applies primarily to populations found along the shores of Upper Klamath Lake. Here, most individuals are relatively tall and somewhat variable in upper surface coloring, with yellow predominant. In more forested settings, individuals also have a proportionately large umbilicus, are about 22 mm in diameter, and have about 6 whorls; but these populations are dominated by rather flatter individuals; the banding is less distinct; and the upper spire coloration is quite uniform and darker. It is possible that two taxa are involved; we will investigate this further this year.

Discussion: Upper and lower surface ground color are unusually variable in this taxon. Both may be dirty yellow or rich brown; individuals with lilac-brown or dark brown upper surfaces are not uncommon. Consultation with key 1I (**APPENDIX C**) may be useful for discriminating this taxon from similar species.

Ecology: Found in two sorts of habitat: 1) restricted to large-scale dry and open vesicular basalt taluses at lower elevations; commonly, taluses with this species have accompanying seeps or springs, and snail colonies are found mostly near talus base, *i.e.,* close to the lake; plants associated include *Urtica*, *Clematis*, *Sorbus*, *Prunus*, and *Celtus*; surrounding plant community is sage scrub; 2) found in mixed conifer forest, generally a combination of sugar pine, lodgepole pine, and douglas fir; most sites limited to vicinity of old-growth logs, generally not lodgepole pine; occasional in rock piles in such forest; generally, such habnitat is partly open, semi-xeric; and occurs at moderate elevations. In both habitat types, few other land snails co-occur (often, *Pristinicola chersinella* and *Prophysaon* n. sp. 1; sometimes, *Vespericola* n. sp. 14). A xerophile species.

Original distribution: Probably once common on both sides of Upper Klamath Lake (Pilsbry, 1939) and on the eastern side of the Cascades in Klamath County.

Current distribution: This is the common *Monadenia* of Winema National Forest, occupying the western portion of Klamath County, with the best colonies around Lake of the Woods. It appears to be absent from pure lodgepole pine stands. Sites east of Upper Klamath Lake are very few, so far just along the shore and base of Modoc Rim. We have searched parts of Klamath National Forest to the south, finding very few sites (none live so far); searches in Deschutes National Forest to the north have also been unsuccessful thus far. The species appears to be declining in areas occupied and numbers, due to a combination of human modification of habitat and extended dry periods in its area of occurrence.

Southwestern Oregon distribution: It seems that this taxon or one much like it may replace *Monadenia fidelis celeuthia* in a limited area west of the Cascades Crest, namely in the eastern third of Jackson

County at moderate to high elevations along Little Butte Creek and possibly along the Klamath River drainage portion of southern Jackson County. So far, however, we have been unable to confirm sites west of the Cascades crest from live material. Interestingly, the Klamath taildropper (q.v.) occurs on the west side only in this same area, generally at the same sites. *Monadenia* from this area needs further study. In the Pelican Butte area, we have found either live or dead specimens of this Winema area endemic at all 13 of our sites. None are large colonies.

Threats: Talus mining and quarrying in vicinity of remaining sites; road building and road and railroad track (Union Pacific) maintenance along the US 97 and Oregon 140 corridors; roadside and trackside spraying for weed control. This area has suffered recent rock slides (1993-1995); proposed measures to alleviate that problem may eliminate colonies.

Criteria for inclusion: Local endemic; occurrence on public lands; ongoing threats. Population trends (number of sites, number of individuals) are downward. It is unlikely that many additional sites will be found.

Recommended status: At the present time this species has no special status; it should be considered a Sensitive species by the Forest Service and BLM. Federal and State (Oregon) listing as Endangered is appropriate, due to specialized habitat and obvious threats to that habitat, as well as recent habitat loss. We made the same recommendation in Frest & Johannes (1995a). This taxon should be a ROD Survey and Manage and Riparian Reserve species as well.

References: Pilsbry (1939); Frest & Johannes (1995a); Deixis collections, 1991-1995, 1996-1998.

Prophysaon (Prophysaon) n. sp. 1
Klamath tail-dropper

Type Locality: None designated as yet; undescribed species.

Description: A medium-sized (to 4.0 cm) species of *Prophysaon* with evenly medium-gray body; head, mantle, and tentacles unmarked, medium gray; sole slightly lighter gray; no posterior dorsal streak; mantle narrow; length about ¼ total body length; pneumostome small, distinctly anterior; dorsal furrows moderately strong, numerous; longitudinal furrows weak, numerous; mantle and body smooth; dorsal constriction present, posterior portion of body behind constriction about 1/3 total length. Mucus colorless, not exceptionally sticky.

Discussion: See key to *Prophysaon* species, **APPENDIX C**, key 10, Frest & Johannes (1999b) for further comparisons. This taxon does not much resemble other described *Prophysaon* species except for *P. coeruleum*. They share such features as elongate, nearly longitudinally arranged dorsal furrows and very weak longitudinal furrows, giving the posterior dorsal body a fingerprint-like pattern when viewed from above (well illustrated in Pilsbry (1948, fig. 377b). This species is larger than *P. coeruleum*; has a dark gray, rather than white, sole; and the body is dark gray (and lacks blue and white pigment granules), rather than bluish. Details of the anatomy and furrow pattern consistently differ as well.

The range of this taxon abuts or interfingers with that of *P. coeruleum* in the upper Rogue and Umpqua drainages (eastern Jackson and Douglas counties, Oregon); so far, however, we have not found instances of sympatric occurrence.

Ecology: Found in moist open areas (floodplains and spring margins) in Ponderosa pine forest. This species is an annual taxon which occurs in *Pinus ponderosa*-Douglas fir forest openings of two sorts: spring-fed meadows with abundant sedges and grasses, *Aconitum*, bryophytes, *Spiranthes*, *Pyrola*, *Salix*, *Allium*, *Cornus stolonifera*, and similar plants; and along mountain streams, also in open, grass- and sedge- covered, seepy areas. The sites vary quite considerably in elevation; but one is a subalpine meadow. Land snail associates include *Deroceras* sp., *Vespericola "sierranus*", and *Pristiloma arcticum? crateris*, as well as a variety of small, more widespread taxa.

Original distribution: Crest and east side of Oregon Cascades: probably south of Deschutes National Forest but including parts of Winema and Rogue River National Forest.

Current distribution: We recently collected this taxon at a number sites in the Upper Klamath Lake drainage, many around Lake of the Woods and others on the west and east sides of Upper Klamath Lake from Klamath Falls north nearly to Crater Lake. Occurrence in Crater Lake National Park and vicinity is quite likely, as associated species (*e.g.*, *Pristiloma arcticum crateris*) are known to be found there. Collected in 1997 in eastern Jackson County, Oregon, at several locations, both on Medford BLM and Rogue River National Forest lands. This species seems to replace *Prophysaon coeruleum* in those portions of the Cascades and Upper Klamath Lake drainages it inhabits. This is a Winema and vicinity endemic, like *Monadenia (Monadenia)* n. sp. 1.

Southwestern Oregon distribution: This taxon has a limited distribution west of the Cascades Crest. It occurs commonly in the upper parts of the Little Butte Creek drainage (a part of the Rogue River system) and in the Klamath River drainage (mostly the Jenny Creek drainage) in eastern Jackson County. Where it appears, it may be common; and it appears to completely replace *Prophysaon coeruleum* in the same areas. Common co-occurrence with the Winema sideband (q.v.) has also been noted. In the Pelican Butte area, found at 11 of our 19 sites.

Threats: Logging; grazing; construction of roads and maintenance of ski areas; development of lakes or housing and resorts; spring and riparian development. One site is partly badly grazed; the species was found in the areas not as badly grazed.

Criteria for inclusion: Riparian associate; mature forest associate; occurrence on public lands; habitat reduction and fragmentation; human impacts, past and projected, to whole of known range.

Recommended status: Currently has none. It should be considered a Sensitive species by the Forest Service, BLM, and other land management and wildlife agencies. It should also be a ROD Survey and Manage and Riparian Reserve taxon. State (Oregon) and federal status as Endangered is likely justified, although further survey work would be helpful.

References: Deixis collections, 1995-1998.

Vespericola n. sp. 14
Winema hesperian

Type Locality: None designated as yet; undescribed species.

Description: A small to medium-sized (to 13 mm at 5 1/2 whorls) species of *Vespericola (s.l.)* with deep reddish-brown shell; nepionic whorls 1 1/4, wrinkled-granular; immediate postnepionic whorls low growth lines; growth lines persist to last whorl, but no striae; shell surface matte; periostracal setae extend to last whorl; rather fine, short, and moderately dense; early whorls strongly angular; angulation persists to last whorl as distinct shoulder above whorl midpoint; constriction just behind aperture; no whorl expansion behind constriction; whorls tumid below; depressed conoid spire above; H/W ratio about 0.62; whorls slightly narrow and slightly rapidly expanding compare to most *Vespericola* species; umbilicus small, diameter ca. 1.2 mm; contained in full width about 10 times; about 1/2 covered by barely reflected columellar lip of aperture; lip terminates to northwest of umbilicus; apertural lip moderately broad, even except at columella; almost flat, about 1.0-1.2 mm in width; appears to lack even traces of lamellae; parietal wall smooth, lacking lamellae. Body color light pink-brown overall, with head and tentacles darker brown.

Discussion: See key to SW Oregon *Vespericola* species, **APPENDIX C**, Frest & Johannes (in press) for further comparisons. This taxon does not much resemble other described *Vespericola* species in its area except for *Vespericola* n. sp. 13. These two species share such features as an angular, shouldered periphery; and suppressed apertural lamellae. The Clearwater hesperian, however, lacks periostracal setae and has a taller spire. Note that this is a member of the group which includes the Mount Hood hesperian also and is deployed around the axis of the Cascades. The Mount Hood hesperian is larger; has a taller spire; also lacks periostracal setae on the adult; and, like the Clearwater hesperian, is predominantly brownish in color rather than reddish.

Ecology: Found in relatively dry mixed coniferous forests, often with sugar pine, Douglas fir, and Ponderosa pine. It is not found in pure Ponderosa pine forest. Most often, it occurs in small numbers closely associated with old growth logs in relatively mature forest. No large populations are known. Most sites occur at moderate to high elevations. As noted above, a member of the recently discovered semi-xeric, mixed coniferous forest-dwelling lineage seemingly deployed along the Cascades axis in Oregon and so far consisting of three species, all rather rare and isolated.

The unusual habitat is worrisome, as old growth logs cannot be expected to persist indefinitely and current logging patterns call for cutting before additional such logs become available. This taxon commonly occurs with the Winema sideband and *Pristiloma chersinella*. Both of the latter are more widely distributed in the Winema National Forest than this *Vespericola*, however.

Original distribution: East side of Oregon Cascades in Winema National Forest, especially around Lake of the Woods; probably south of Deschutes National Forest and north of Klamath National Forest.

Current distribution: We recently collected this taxon at several sites around Lake of the Woods and its immediate environs in Winema National Forest. The species was rare at all sites.

Southwestern Oregon distribution: This taxon has a limited distribution east of the Cascades Crest. Common co-occurrence with the Winema sideband (q.v.) has also been noted. In the Pelican Butte area, this taxon has not yet been found. It also seems absent from the lowland areas and spring meadows around Upper Klamath Lake, where it is replaced by *Vespericola sierranus*.

Threats: Logging; grazing; construction of roads and maintenance of ski areas; development of lakes or housing and resorts; spring and riparian development. Some sites are partly badly grazed; the species was found in the areas not as badly grazed. Most sites represent the most mature surviving forest tracts in the area . A common feature was retention of common woody debris, specifically large old-growth logs from the first, rather selective cutting operations in this region. Absent from secondary and tertiary growth stands (unless these still had persistent old growth downed logs) and from pure pine plantations.

Criteria for inclusion: Mature forest associate; occurrence on public lands; habitat reduction and fragmentation; human impacts, past and projected, to whole of very limited known range.

Recommended status: Currently has none. It should be considered a Sensitive species by the Forest Service, BLM, and other land management and wildlife agencies. It should also be a ROD Survey and Manage and Riparian Reserve taxon. State (Oregon) and federal status as Endangered is likely justified, although further survey work would be helpful.

References: Deixis collections, 1998-1999.

NON-SENSITIVE TAXA

Prophysaon (Prophysaon) andersoni (Cooper, 1872)
reticulate taildropper

Discussion: Slug medium-large, 3 to 6 cm when extended; body color reddish-gray, with some scattered black pigmentation (usually less on mantle); dark, generally continuous, longitudinal band on each side of mantle; distinct reddish dorsal streak on tail; reticulations numerous but coarser than in *P. foliolatum*; outlined in dark pigment; abscission zone moderately distinct, making up 20-30% of the body length (proportionately shorted than in *P. foliolatum*); sole light gray; mucus opaque yellow.

This is a complicated and variable species. We have used this term for the common medium-sized *Prophysaon* with reddish-fawn ground color and yellow mucus, which ranges from extreme southwestern Alaska to the San Francisco Bay area, California. From Corvallis, Oregon south into California there is a common variant with yellow bordering the foot and a largely dark, bluish-black groundcolor. This form when mature is often 5-7 cm in extended length; lacks any reddish pigment; and slightly finer reticulations (but not so much as in typical *P. foliolatum*). We have noted this form in pure colonies in Benton, Lane, Douglas, Jackson, Coos, Josephine, and Curry counties. In the area of its occurrence, it is generally more common than the reddish form. So far, it does not seem to occur strictly sympatrically with the reddish variant; and we have not seen it north of Benton County, Oregon. Roth (1999, pers. comm.) informs us that this may be the common form currently at Oakland, the type locality of *andersoni*, and elsewhere in the Bay area. Pilsbry's (1948) descriptions of anatomy were based upon preserved Oakland specimens. As such material rather quickly tends to depigmentize, one may well wonder which form was used. Currently, we use the name *Prophysaon* n. sp. 3 (q.v.) for the dark form from southwestern Oregon and northwestern California, in keeping with Cooper's (1872) external description. But it is possible that Oakland material of the dark form is true *andersoni*.

This is a variable taxon in terms of color, with melanistic and albino individuals not infrequent in large populations. In some areas, the most commonly observed from is a smaller (3-5 cm) slug with brownish upper body ground color and yellowish dorsal streak and foot borders; but other morphology as described above. Dissections of Washington specimens of this form indicate an *andersoni*-like anatomy. In at least one large population observed repeatedly over three years, there appears to be a regular seasonal replacement of the reddish forms by the brownish forms with yellow borders. In other areas, such as the Columbia Gorge, the reddish form appears to be rare to absent and the brownish form is prevalent at all seasons.

This taxon somewhat resembles another very variable species, *P. foliolatum*. This slug, however, is larger (7-10 cm length); has finer reticulations that are also not as strongly pigmented; has a very narrow dorsal streak and has a longer abscission zone, constituting 30-40% of total body length. When fully extended, the head of *P. foliolatum* does not extend as far as the mantle's length in front of the mantle and appears blunt; the head of *P. andersoni* extends a mantle's length forward of the mantle proper and appears much more acuminate. The mantle of *P. foliolatum* often has the longitidinal color bars broken up and fainter, so that much of the mantle is colored like a ripe banana. Almost always, the mantle longitudinal edges are bright yellow and there is a larger yellow pigment dot along the posterior mantle edge, where it contacts the dorsal streak, in this species. *P. andersoni* of the reddish form typically lacks these mantle features. The brownish form of *P. andersoni* and the dark form (*P.* n. sp. 3) may also have yellow-bordered mantles, although the border is often very narrow and the posterior spot often absent. Note that xanthic (often yellow pigment only) and melanistic (almost black) individuals of *P. foliolatum* are not very rare. Also, there are two common color forms (or species?) currently subsumed in *P. foliolatum*. One has the groundcolor above reddish to reddish-gray, much as in *P. andersoni*. The second has yellow to yellowish-gray ground color (lacks red pigment entirely). Both are found as pure colonies and both may have xanthic or melanistic individuals constituting a small part of the population. We are not yet certain of the range limits of the two forms. The red form is known to extend from southern British Columbia south in the Cascades and along the Coast and Olympic Peninsula to Tillamook, Washington, and Multnomah counties, northwestern Oregon. The yellow from extends from southwestern Washington (Willapa Hills) to northwestern Oregon. Note the apparent absence of typical *foliolatum* from southwestern Oregon.

Ecology: Found generally in relatively mature, moist forest, often with some deciduous tree or shrub component; and often at slope base, or along borders of floodplains; sometimes seen in more open but very moist situations, such as stream borders.

General Distribution: Most of the Oregonian and Klamath provinces. Reports from the Washingtonian areas, except possibly Oregonian border sites, *e.g.* Idaho (Pilsbry, 1948) may be mistaken. The dark form has a distribution approximately from Corvallis (Benson County), south in both the Coast Range and western Cascades (and Willamette Valley) into southwestern Oregon. We are currently uncertain of the southern range limits in California. Noted from all counties in the survey area, but more common in Douglas, Coos, Curry, and northern Jackson counties

Southwestern Oregon Distribution: See above. In the Pelican Butte area, found at only one of our sites; and seen in the Winema National Forest generally rather rarely; found mostly west of the Cascades.

Status: This taxon is the most widely distributed of the *Prophysaon* species. So far, there appear to be enough relatively secure populations that special protection does not seem to be warranted. Of all the native slug species, this appears to be the only one reported to have been an agricultural pest; and there is only a single report (Johanson & Brannon, 1955, 1956).

Deroceras (Deroceras) laeve (Müller, 1774)
meadow slug

Discussion: Slug small, extended length 1.5-2.5 cm; groundcolor chestnut to very dark brown, generally with darker flecks; mantle often lighter in color; fewer and larger concentric rings fingerprint pattern) than other species; rim of respiratory pore slightly paler than mantle; posterior keel short, truncates rather abruptly; sole pale brown; mucus watery, colorless.

This slug is smaller and darker than *D. reticulatum*; and the slime is clear and thin. *D. caruanae* is generally larger and the respiratory pore margin is distinctly paler than the rest of the mantle. *D. monentolophus* is very difficult to distinguish from this taxon, as it is the same size and the coloration is very similar. *D. monentolophus,* however, has a more heavily speckled mantle and the area surrounding the respiratory pore (pneumostome) is also pigmented. The two are best differentiated on anatomical characters: see Pilsbry (1948) for full discussion.

This taxon is known to have been native to the US prior to European settlement, as indicated by finds of fossils in Mid-continent loess deposits (often Late Wisconsinan: Woodfordian) of Nebraska, Kansas, Iowa, Illinois, Wisconsin, Missouri, Indiana, Arkansas, and Louisiana. Bequaert & Miller (1973) regard the fossil record of this taxon in North America as Pliocene-sub-Recent; this includes the supposed fossil taxon *D. aenigma* Leonard, accepted as valid by Hubricht (1985). Note that Bequaert & Miller (1973) regarded as native occurrences in Arizona at elevations of 4,500-8,000 ft. and as adventive most or all sites in cultivated areas, generally at lower elevations.

There is a possibility of additional cryptic taxa in *Deroceras* in the western US. The classic examples are *D. monentolophus*, *D. hesperium*, and *D. heterura.* In some relatively natural, high areas in the NW, black or bluish-gray *Deroceras* may exist in pure colonies; these forms require further study.

Ecology: This is a very common slug of grasslands, wet areas, and open spaces of all kinds. This taxon seems less dependent upon very persistent moisture than is *D. reticulatum*, although the two are quite often found at the same sites. Found quite abundantly in synanthropic settings of all sorts; but also completely naturalized. Less common in forests than along floodplains. May occur essentially to treeline or even above.

General Distribution: Holarctic; essentially circumboreal (Bequaert & Miller, 1973). The situation is complicated in the US, as elsewhere, by the likelihood that an original native distribution is overlain by repeated introductions of European stock. Likely native from the Arctic Circle to Central America (Pilsbry, 1948; Bequaert & Miller, 1973). Roth (1997) accepts native occurrence in California. Branson (1977) records 14 Washington Olympic Peninsula localities. Branson (1980) found it at 2 Washington Cascades sites. Oddly, Branson & Branson (1984) noted it in Oregon only from Klamath County; we have found it quite common in all of the coastal Oregon counties and throughout the Willamette Valley region.

Southwestern Oregon Distribution: Quite common in all counties, particularly in synanthropic settings; but also in moist habitats generally, at a range of elevations, including isolated springs. Usually not noted in mature NW forests, a finding that echoes Hubricht (1985, p. 22) "I have never found it in deep woods". In the Upper Klamath Lake area, found at two types of sites: low elevation floodplains, marshes, and stream-spring borders; and higher elevation spring meadows, seeps, or bogs. So far not found on Pelican Butte.

Status: Essentially ubiquitous adventive, except in very dry areas; no protection is appropriate for a variety of reasons.

***Pristiloma (Priscovitrea) chersinella* (Dall, 1886)**
blackfoot tightcoil

Discussion: This is a moderate-sized *Pristiloma* species, with 4 1/2-5 1/2 whorls at maturity (diameter ca. 3.5 mm); small, open umbilicus; evenly convex whorls with periphery at midpoint; low, conic spire; and glassy, yellow or yellowish-green shell. The considerable amount of black pigment, especially on the foot, inspired the common name and differs from the pigment pattern of most other *Pristiloma* species. *P. wascoense* also has an open umbilicus and conic spire; but is smaller, more depressed; and merely perforate.

Ecology: This species is a high-ground form, most often seen at relatively dry and partly to wholly open sites. It can frequently be found on rocky ground or in talus. Common associates include *Vitrina pellucida* and *Vallonia cyclophorella*. It has been noted in sage scrub and mountain mahogany communities, and in area with manzanita and similar shrubs.

General Distribution: Formerly reported from the east side of the Cascades in southeastern Oregon and from Sierra Nevada (California) sites (Pilsbry, 1946).

Southwestern Oregon distribution: We have noted this taxon from 2 sites in eastern Jackson County. These locales are on the west side of the Cascades Range, at relatively high elevations near to the Cascade crest. *P. chersinella* is relatively common in the eastern Cascades Winema National Forest, Klamath County, Oregon, where it occurs much more widely, from low to high elevations and in a variety of plant communities, including Ponderosa pine and sugar pine-Douglas fir forests, as well as rock piles and sage and manzanita scrub. Generally, it is not found at very moist sites. In the Pelican Butte area, it was note at 12 sites. A single specimen was reported under the name *Pristiloma* cf. *chersinella* from the Coquillle River drainage, Coos County, by Branson & Branson (1984). This is more likely to be *P. wascoense*, a possibility noted by the Bransons.

Status: So far as we are aware, this taxon is not in need of special status in most of its historic range, even though it appears to be absent from heavily logged portions (most) of it. It also appears to be absent from area with geologically recent volcanic activity, such as the eastern parts of Klamath National Forest; parts of Mt. Lassen Volcanic National Monument; and the eastern parts of Deschutes National Forest. Numerous small separated colonies appear to remain in much of the historic range. On the west side of the Cascades, however, it appears to be quite rare and limited in occurrence; with further study, special status may be appropriate regionally; but likely not on the east side of the Cascades.

Euconulus fulvus alaskensis (Pilsbry, 1899)
western brown hive

Discussion: The most distinctive feature of this western US subspecies is the finely and evenly radially striate upper surface with no spiral striae, together with the nearly smooth (no or very rare spiral striation) base. Pilsbry (1946) described this subspecies from immature material. Mature specimens can have from 5-6 whorls and may reach a diameter of about 4.0 mm. As noted by Pilsbry, this subspecies has a lower whorl count at comparable size to a given *E. fulvus fulvus*. The upper surface of the latter is generally glossy, with spiral striae fine, but distinct, if patchy; while radial striae are indistinct and irregular. The upper surface of *alaskensis* is characteristically silky, due to the very fine, regular radial striae. The spire in *alaskensis* is often slightly lower (more dome-shaped above); and the periphery is often slightly angular.

Thus far, this is the only species of *Euconulus* commonly encountered in the Pacific Northwest. It requires further study to delineate its distribution in the Rocky Mountain and southwestern states; and possible distribution in the middle and eastern US should not be ruled out. We have noted one nearby introduction of the European taxon *Euconulus alderi* at Klamath Falls, Klamath County, Oregon, in 1997, so that it is possible that other such waif populations may be found in the survey area. So far as we are aware, *E. alderi* has not been previously reported in the US.

Ecology: Found in a variety of situations, including moist forests, relatively open, moist prairies, and occasionally rock piles. This taxon is often abundant in moderately moist areas. Quite frequently encountered in moderately to highly diverse locales, often with several other small taxa. This subspecies seems to range from near sea level to at least subalpine locales and is perhaps as common or more so at middle to high elevation sites.

General Distribution: Well distributed originally from coastal Alaska to the San Bernardino Mountains and the Sierra Nevada of California. Easterly distribution uncertain, due to frequent confusion with the nominate form. Probably characteristic of the Washingtonian, Oregonian, Klamath, and Californian provinces, with more sporadic representation in the Southwestern and Rocky Mountain provinces. Noted under the name *Euconulus fulvus* by Branson (1977, 1980) and by Branson & Branson (1984) from a total of 15 sites. In our 1996 western Washington 38 site sample, this subspecies was present at 28 sites, giving it an occurrence ranking of 4 among the 46 taxon total.

Southwestern Oregon distribution: Probably widespread, although most of our sites to date are in Douglas and Jackson counties. It is uncommon at lower elevation and in bogs, seeps, marshes, or meadows at any elevation in Klamath County. We have not yet found it on Pelican Butte.

Status: This taxon appears to be relatively common in southwestern Oregon and is not in need of special status here or elsewhere in its range, although likely absent from the majority of its historic range.

Zonitoides arboreus (Say, 1816)
quick gloss

Discussion: Shell with very low spire; glossy; translucent olive buff; umbilicate, with umbilicus contained about 4.5-5 times in the diameter; adult diameter about 5.5-6.0 mm at 4 1/2 whorls; whorl evenly convex, evenly increasing; nepionic whorls smooth; teleoconch with rather faint and irregular growth lines and nearly obsolete spiral striae; the base smoother yet; aperture lunate; peristome thin, unmodified; animal usually light gray.

This taxon is not readily confused with any other native NW species. *Z. nitidus* is larger; has a proportionately smaller umbilicus; a slightly higher spire; and a more circular umbilicus; the animal is bluish black, as contrasted to the light gray of *Z. arboreus.*

Ecology: In the western US, this widespread taxon occurs very sporadically in three separate habitats: 1) at relatively high elevations, often in more open situations, above timberline, or around edges of swamps, fens, and seeps; 2) along floodplains of lowland streams, often near the outside edge of the floodplain only. On rare occasions, found in rock piles or talus; 3) in rather xeric situations in grassland or scrub, often among rocks or along open stream floodplains.

General Distribution: Perhaps the most widespread single land snail species on the continent. See Hubricht (1985, p. 137, map 321) for US distribution. Note, however, that occurrences in the western US are quite sporadic. This reflects a real situation in some cases, not collection gaps. Moreover, at least (but not all) some western US sites appear to represent introductions. Some such sites are back yards, debris piles near ports, arboretums, and the like. The species is sporadic throughout the Oregonian Province, perhaps more common in Alaska and British Columbia than farther south. Occurrences in the Washingtonian Province are also seemingly more common. This species tends not to be found in mature NW forests, but rather in more open or modified areas.

Branson (1977) noted this taxon from 12 sites; Branson (1980) from 8 sites on both sides of the Oregon Cascades; Branson & Branson (1984) from two Oregon sites. To give an idea of occurrence in more forested sites, note that in our 1996 western Washington sample, this taxon appeared at only a single site of 38, ranking it 35-46 of 46 species.

Southwestern Oregon distribution: So far, this species has not been collected by us in the southwestern Oregon survey area, although both introduced and native occurrence is likely. It definitely occurs native on the East side of the Cascades in the Washingtonian Province. In western Klamath County, it is infrequent in both meadow and forest sites. On Pelican Butte, we have seen it at 4 sites.

Status: Not in need of any special status, except perhaps locally. The likelihood that some sites represent introductions makes it difficult to evaluate the range and significance of this species locally.

Nesovitrea binneyana occidentalis (Baker, 1931)
western blue glass

Discussion: Adult shell diameter 3-3.5 mm at 4 whorls; spire low conoid; whorls evenly convex; aperture rounded -lunate; shell glossy, thin, almost colorless; spiral sculpture fine but distinct; umbilicus small; contained in diameter about 5 times; suture not well-impressed; animal bluish-black.

We follow Riedel (1980), Hubricht (1985), Roth (1997) and Turgeon et al. (1998) in using *Nesovitrea* rather than *Retinella* in association with this species, unlike Pilsbry (1946). This taxon differs from the nominate form largely in that the spiral sculpture is well-developed; most specimens are smaller than *N. electrina*, which also lacks the spiral sculptural feature.

Ecology: The nominate form, according to Hubricht (1985) is found in leaf litter in upland woods. Western occurrences are frequently along floodplain or marsh edges, sometimes at considerable elevations. Sites are often very moist but may be partly or largely open.

General Distribution: Pilsbry (1946) records this taxon as ranging from southern British Columbia in the Oregonian south to northern California. It is also reported from Washingtonian and Rocky Mountain localities; but not from the Southwestern or Californian provinces in our usage. Pilsbry (1946) notes localities in Clallam and Snohomish counties, Washington. Branson (1977) reports this taxon from 4 sites on the Olympic Peninsula; Branson (1980) from 4 Washington Cascade Range sites; Branson & Branson (1984) from a single site in extreme northwestern Oregon. In our 1996 sample of 38 western Washington sites, we found this taxon at just two, ranking it somewhere in the 30-34th position out of 46 taxa total. Roth (1997) accepts this taxon as native to California.

Southwestern Oregon distribution: So far, not noted in the survey area; but probably present in small numbers of sites. Noted elsewhere in western Oregon infrequently; also occurs on the east side of the Cascades in both Washington and Oregon. Uncommon to rare in spring meadows in western Klamath County, especially near Upper Klamath Lake. Not noted on Pelican Butte as yet.

Status: While this taxon has lost most of its historic range, it still remains well distributed in it in many small colonies. It is possible that protection might be advisable in the survey area, if sites continue to be as sparse as first-year research suggests.

***Nesovitrea electrina* (Gould, 1841)**
amber glass

Discussion: Shell low conoid; spire strongly depressed; adults 4.5-5.2 mm at 3 3/4-4 1/4 whorls; shell glossy, transparent, faint yellow or green; sculpture of crowded radial grooves, distinct on upper surface but not reaching base; umbilicus narrow, contained about 4.5 times in full diameter; aperture thin, simple, rounded-ovate; whorls rather slowly expanding; suture not greatly impressed; animal almost black.

The sculpture of radial grooves distinguishes this taxon from any *Oxychilus* species. *R. binneyana occidentalis* generally has faint spiral striation and lacks the radial grooves.

Ecology: In the eastern US, Hubricht (1985) characterizes this as a species of low, wet ground; floodplains, meadows; and pond and marsh edges. Quite common in prairies and along railroad embankments and tracks. Western US sites are similar, with floodplain edges perhaps being most frequent. High elevation sites also occur.

General Distribution: Found though most of southern Canada and the northern half of the eastern US, with the exception of the northern-most areas. Present in Alaska according to Dall, 1910; Pilsbry, 1946) but not noted by Baxter (1987). Note that Dall (1910) does not recognize *N. binneyana occidentalis* as occurring in Alaska. Pilsbry (1946), relying on Dall records (only one Alaska occurrence confirmed by H. B. Baker), thought it generally spread along the Alaskan coast " to Point Barrow on the Arctic Ocean". Occurrence this far north needs to be confirmed. Generally distributed in much of the central and eastern US and adjacent Canadian range; more sporadic in the western States and Alaska. Pilsbry (1946) recorded it from eastern Washington and Oregon sites (Washingtonian Province); Roth (1997) accepts native California sites. Branson (1977) notes it as *Retinella electrina* from one Olympic Peninsula site; Branson (1980) from three west Cascades, Washington sites. Branson & Branson (1984) did not encounter this taxon in Oregon.

Southwestern Oregon distribution: So far, we have not collected this taxon in the southwestern Oregon survey area; but its occurrence, even though sporadically, is very likely. It does occur, rather rarely, in spring meadows in Klamath County. We have not noted it as yet on Pelican Butte.

Status: No special status is needed for this taxon over most of its range, even though total areal extent is very likely very much reduced. Colonies remain numerous and well-distributed, except in the coastal western US, where it is possible that further work could establish advisability of protection.

Discus whitneyi Newcomb, 1864
forest disc

Discussion: This is the taxon long known under the name *Discus cronkhitei* Newcomb, 1865. For discussion of the name and validation, see Roth (1988b). Shell depressed; thin; buff to light brown, very low conoid spire with convex whorls; sutures deeply impressed; wide umbilicus contained about 3 times in the diameter; nepionic whorls smooth; teleoconch whorls with distinct retractive riblets; whorls about 4 1/2 at 6.1-6.5 mm diameter, evenly expanding; aperture rounded, unmodified.

Difficult to confound with any other native NW taxon. Western examples are often reddish-brown; and the body color is often light gray or nearly unpigmented; in eastern examples, the tentacles are almost black and the body color distinctly grayish. Very few NW examples attain the full size.

Ecology: In the eastern US, found in very moist situations varying from forests to prairies and roadsides and including marshes, swamps, and floodplain edges; mostly lowland situations. In the NW, found in two site types: 1) edges of floodplains of larger, more level streams, often at low elevations; and 2) at relatively high elevations, in more open habitats, including rock piles, talus, and areas above timberline. Commonly found in wet forest situations in the East; rarely in the West; but an unfortunate common name in both cases.

General Distribution: See Hubricht (1985) for eastern distribution. Found over most of the western US as well, but far more sporadically. Relatively common in the northern portions of the Oregonian Province, at least as far as the Aleutian Islands (*e.g.*, Roth & Lindberg, 1981) and central Alaska (Baxter, 1987); and in much more xeric situations in the Washingtonian, Rocky Mountain, and Southwestern. In the southern Oregonian and Klamath provinces, the taxon is present but rather sporadic.

Branson (1977) notes two sites from the Olympic Peninsula (under the name *Discus cronkhitei*); Branson (1980) one site from the Washington Cascades. Branson & Branson (1984) note no Oregon sites. Some idea of relative abundance may be inferred from our 1996 western Washington site sample, in which of the 38 sites total, *D. whitneyi* was noted at one (ranking: 35-46/46).

Southwestern Oregon distribution: So far, only rarely noted from southwestern Oregon, at higher elevation sites. Finds elsewhere in the state are uncommon but widespread. In Klamath County, the species is more common, especially at lower elevation sites, such as in spring meadows and near Upper Klamath Lake. We thus far have no sites on Pelican Butte.

Status: Nationwide, this taxon continues to be well distributed. It is uncommon to rare locally; but needs additional work to determine local status.

Punctum (Punctum) randolphi (Dall, 1895)
conical spot

Discussion: Shell reddish-brown, with dull silky luster, low conoid spire; whorls typically 4-4 1/2 at diameter of 1.1-1.4 mm; sculpture of fine, evenly spaced transverse riblets and weak, very fine striae; umbilicus small and deep, about 1/5 full shell diameter; aperture obovate, somewhat oblique, unmodified; nepionic whorls smooth.

Both *Paralaoma caputspinulae* and *Punctum hannai* somewhat resemble this taxon; but can be distinguished by their larger shells, with more flattened spires. Both also tend to have the riblets more widely separated (interspaces distinctly wider than riblets). According to Roth (1985), *randolphi* can be distinguished by the following: "the umbilicus is narrower, the spire higher, radial ribbing more delicate and spiral microsculpture less pronounced." *Planogyra clappi* has strongly periostracally fringed riblets, also widely separated; and the spire is nearly flat, with a very wide umbilicus. *Punctum californica* may be difficult to distinguish from this taxon. It is said to be slightly larger; lower; and with less conspicuous riblets.

Ecology: Found most often in moist forest litter at a wide range of elevations. Also common in very moist, rather more open situations, such as swamp, marsh, or fen edges and in moist rock piles or talus. In the Oregonian area, often found with a variety of other small land mollusks, including *Carychium occidentale, Pristiloma lansingi, Euconulus fulvus alaskensis, Striatura pugetensis, Vertigo columbiana*, and *Columella* spp.

General Distribution: Well-distributed in the Oregonian and Washingtonian provinces. In the Klamath Province, seems to be well-distributed to the California border. Roth (1997) does not include this species, although Roth (1985) does accept two sites.

Southwestern Oregon distribution: This is one of the most commonly encountered small land snails in the survey area. It was noted from all counties except Coos and undoubtedly occurs there also. Most sites were either coastal or in relatively mature forest. It is fairly widely distributed in similar sites in Klamath County (at least the western portion). We noted it at 3 Pelican Butte sites.

Status: Likely, this taxon requires no special status anywhere in its historic range, although it has been extirpated from most of it. Numerous, widely distributed small colonies appear to remain.

Paralaoma caputspinulae Reeve, 1855
striate spot

Discussion: Shell with low conoid spire; strongly convex whorls with deeply impressed sutures; color light yellowish olive to light brownish olive; nepionic whorls with spiral striae; teleoconch ornament consists of rather separated radial riblets with fine microscopic spiral striae; narrow and deep umbilicus, contained about 3.6 times in diameter; diameter 2.0-2.4 mm with 4-4 1/2 whorls.

This taxon somewhat resembles *Punctum hannai, P. randolphi*, and *Planogyra clappi. P. caputspinulae* is larger, darker colored, and less tightly coiled (has a slightly proportionately larger umbilicus than *P. hannai*). *P. randolphi* is smaller, has a higher spire, and the riblets are much more closely spaced; the umbilicus is also distinctly narrower and the nepionic whorls are smooth. *P. clappi* has a flatter spire and very wide umbilicus; the nepionic whorls are microscopically granular here also.

This taxon was long known locally as *Punctum conspectum* (Bland, 1865), type locality Oakland, California. B. Roth (1985, 1986b) pointed out its synonymy and the final disposition was made by Roth (1987)

Ecology: Found in a variety of situations locally, ranging from occurrence as far north as the Aleutian Islands and other parts of Alaska (Baxter, 1987) to forested locales to semixeric sites, including talus and rock piles. Quite commonly found with other small taxa, including *Vertigo modesta modesta, Pristiloma lansingi. P. chersinella*, and *P. arcticum arcticum, Planogyra clappi, Punctum randolphi, Discus whitneyi*, and *Euconulus fulvus alaskensis.*

General Distribution: The world distribution of this rather tramp species has been summarized by Roth (1986b, 1987). Locally, it is known from throughout the Oregonian and probably all of the Washingtonian provinces into the Klamath, Southwestern, and Californian. Pilsbry (1948) noted Washington, California, and Oregon sites. Branson (1977) reported it from a single site; Branson (1980) from 6 sites (all under the name *Punctum conspectum*). Our 1996 western Washington 38-site sample may provide some perspective on relative abundance. It was noted at 12 sites, giving it a ranking of 17 among the 46 taxa noted.

Southwestern Oregon distribution: In western Washington, this is frequently a forest taxon, but found also in drier sites, as also in eastern Washington. So far, we have found this species only rarely, mostly in rather dry areas in eastern Jackson County. It occurs also in adjoining Klamath County as well, generally in rock piles or along stream edges or in spring meadows. We have not yet found it on Pelican Butte.

Status: This species appears to be in good condition in most of its range. Western, particularly SW Oregon, sites are not common; but more information is required to determine local status.

Columella "edentula" (Draparnaud, 1805)
toothless column

Discussion: The specific identity of North American *Columella* needs restudy. According to Hubricht (1985), *C. simplex* Gould is a valid taxon applying to many eastern US occurrences; but the genus may have other taxa present, much as in western Europe and the UK (for the latter, see Paul (1975). Comparison of western specimens with many eastern US lots indicates that the common species in each are not identical. Pilsbry (1948) ascribed some Oregon lots to *Columella edentula*, the widespread European species, noting that they "resembled the typical European *edentula* closely". Limited comparisons with European lots indicated a similar conclusion to us also; but note that, as Pilsbry also commented, western US individuals are generally smaller. Close anatomical and other work is required here. Pilsbry (1948) also recognized *Columella alticola* in the Rocky Mountain and some western states. This was recognize as a full species in Turgeon et al. (1988) but downgraded to a subspecies of *Columella columella* in Turgeon et al. (1998).

Note that Branson (1977) reported *Columella alticola* from the Olympic Mountains, Washington; but not *C. edentula*. We found this taxon quite common in the same area; perhaps the most common taxon after *Nearctula* sp. No *Columella* is reported from the Washington Cascades or the Oregon Cascades and Coast Range by Branson (1980) and Branson & Branson (1984), nor for that matter from northern California (Branson & Branson, 1991); but the genus is common in these areas also. Specimens possibly attributable to *C. alticola* are fairly common at Washington sites; but so far have not been seen in southwestern Oregon. We noted *C. "edentula"* from 18 sites and *C. alticola* from 8 sites in our 1996 sample of 38 western Washington localities. *Columella* species thus ranked 12th and 19th or 20th out of 46 taxa in that sample set.

Ecology: *Columella* in this area is found frequently in forest litter and under sticks and branches on the forest floor; it is at least as frequently seen crawling on smaller deciduous tree and shrubs, often those taxa which form boscades, such as *Alnus*, *Cascara*, and *Cordylus*, and has been found up to 5 m above ground level. The arboreal occurrences are often with *Nearctula* n. sp. The genus has also been noted in numbers frequently on sword fern (*Polystichium munitum*) stipes. Litter sites frequently include a variety of small taxa, such as *Pristiloma lansingi*, *Euconulus fulvus alaskensis*, *Vertigo columbiana*, *Planogyra clappi*, *Carychium occidentale*, and *Striatura pugetensis*, as well as more common large genera, such as *Vespericola*, *Monadenia*, *Haplotrema*, and *Ancotrema*.

General Distribution: Western US occurrences stretch from arctic Alaska to northern California. The taxon appears much less common in the Washingtonian as compared to the Oregonian, Klamath, and Rocky Mountain provinces. Pilsbry (1948) did not note California occurrences; but Roth (pers. comm., 1998) has noted this species in northern California. We have collected it in Del Norte County.

Southwestern Oregon distribution: Among the smaller taxa, this is perhaps second only to *Nearctula* n. sp. in site abundance in the southwestern Oregon survey region, being noted from all counties except Coos (where it also no doubt occurs). In Klamath County, noted uncommonly from spring meadows at various elevations. No Pelican Butte sites as yet.

Status: No special status is needed, here or elsewhere in its range. Although many of the smaller land snail taxa appear somewhat less common in southwestern Oregon than they do elsewhere in their range, this species seems to be quite widespread and common even here.

Vertigo (Vertigo) modesta modesta Say, 1824
cross vertigo

Discussion: Shell cylindrical, often cinnamon colored; glossy; rather weakly striate, with striation most distinct on the middle whorls; whorls narrow, strongly convex; adults typically about 5 1/2, with length ca. 2.4-2.6 mm; aperture only slightly expanded; no sinulus; weak crest visible in side view; no depressions over palatals; four lamellae typically, slightly inset from apertural lip; all short, rather peg-like; parietal, central columellar, and upper and lower palatals arranged to form a cross (columellar opposite upper palatal; parietal opposite lower palatal); lamellae generally not deeply immersed; no palatal callus.

This species is often regarded as quite variable *e.g.*, Pilsbry (1948), although populations in our experience show relatively little variation in adult specimens. For example, the senior author once examined 5,000 adults from a single Iowa loess site without noting any variation in lamellar number. Some specimens show a vestigial to weakly developed angular. Many of the forms with reduced lamellae likely represent separate taxa, *e.g. V. genesii.* Note that the European usage of this name is somewhat different, *i.e.* "shell pale yellowish-brown, translucent, not glossy, usually with a silky sheen due to numerous regular fine growth-lines"; "mouth usually with 3-4 rather deeply-set small denticles; 1 parietal, 1 columellar, 1 lower palatal (the last sometimes absent, sometimes an additional upper palatal" (Kerney & Cameron, 1979). The *modesta* species group needs careful revision, as noted also by Branson (1977); and here may be a reverse case of the early tendency in malacology to ascribe US specimens to European taxa, *e.g. Columella edentula* and *Euconulus fulvus.*

Ecology: Widely distributed in moist habitats in the northern portion of North America, including Alaska. In the more southerly occurrences, most likely to be confined to higher elevation sites such as open mountain meadows; but also found at lower elevations around seeps, bogs, or fens.

General Distribution: This taxon is quite widespread in the Northern Province; and in the Western Division in the Rocky Mountain and Washingtonian provinces. Its distribution in the Oregonian is more sporadic, as by southern British Columbia it appears that the taxon is largely confined to higher elevation sites, *i.e.*, along the main Cascades axis; or to bogs and fens regardless of elevation.

Branson (1977) noted three sites in the Olympics; Branson (1980) one Washington west Cascade site. Pilsbry (1948) noted no occurrences of the typical form in Washington, Oregon, or California. Note that our 1996 western Washington sampling of 38 sites yielded only 3 occurrences, ranking the taxon 26-29th of 46.

Southwestern Oregon distribution: So far, no sites; but quite possible. Definitely present in Washington. Henderson (1936b) noted Oregon sites for *V. modesta sculptilis* in Wallowa County (Washingtonian Province). Rare at high-elevation bog sites in western Klamath County. No Pelican Butte sites as yet.

Status: No special status required for much of the continent; but western Washington occurrences are few and scattered. The status of eastern Washington and Oregon occurrences needs to be reassessed. Any southwestern Oregon occurrences would likewise be limited in area and extent, and likely in very restricted habitat.

Vitrina pellucida (Müller, 1774)
western glass-snail

Discussion: Shell thin, transparent, shining greenish; 3 whorls at 10 mm diameter, slowly expanding, with the final comprising most of the shell; spire greatly depressed; aperture ovate, large, oblique; lip thin, unmodified. The living animal is usually gray; and the mantle lobe does not override the shell to any great extent.

Reported in Pilsbry (1946), Branson (1977, 1980) and Branson & Branson (1984), as *Vitrina alaskana*. Noted under both names in Baxter (1987).

Ecology: Found in a variety of warm and cold xeric habitats, often at rather open sites, ranging from near coastal to subalpine elevations. Quite frequent in talus and on rocky ground; seldom seen in forested locales; but quite possible in more or less long-lived forest openings or meadows. Pilsbry (1946) reports adult animals from August to October; but in our experience most adults are more likely to be encountered in the NW in October to December. Often associated locally with such small species as *Pristiloma chersinella*, *Vertigo modesta*, *Vallonia cyclophorella*, and *Punctum randolphi.*

General Distribution: Quite widespread in nearly all of the western Division provinces; but tending in the Californian and in the Southwestern to be confined to higher elevations. This taxon seems particularly widespread in the Washingtonian and Rocky Mountain provinces. Noted definitely in Alaska from the North Gulf Coast and Aleutian Islands

Branson (1977) found it at 6 high elevation sites in the Olympic Mountains; Branson (1980) noted it at high and low elevation sites on both sides of the Washington Cascades. Branson & Branson (1984) found it at 4 sites on the east side of the Oregon Cascades, but not the west. Of the 38 sites in a western Washington sampling conducted in 1996, we noted it at only one site, ranking it in the 35-46/46 range. Most of our sites were forested.

Southwestern Oregon distribution: This is not a common species in much of the more forested part of the survey area; but quite likely to be encountered in the more dry and open portions, such as the areas around Grants Pass, Medford, Ashland, and Roseburg. Also occurs in higher elevation portions of eastern Jackson and Douglas counties. Likely in Siskiyou Mountains as well.

Status: This species seems to be well distributed and hardy. It requires no special status except perhaps locally; but further work here would be required; it may be quite widespread in habitats as yet inadequately sampled.

Vallonia cyclophorella Sterki, 1892
silky vallonia

Discussion: Shell very low conoid, almost flat, with moderately impressed suture; initial whorls smooth; later whorls with closely-spaced finely membranous transverse ribs (ca. 60 on last whorl); shell diameter 2.6-3 mm in adults (3-3 1/2 whorls); shell thin, color lacking or grayish-horn; appearing almost silky to naked eye; peristome nearly circular; slightly everted but lacking distinct lip; strongly oblique but not deflected; umbilicus broad, shallow, nearly circular; contained in full diameter 2.6-3 times.

The fine ribbing is distinctive. This taxon, especially when weathered, can resemble *V. gracilicosta*, but the latter lacks membranous ribs (those present being low but distinct and slightly separated by equal interspaces) and has a distinct, though narrow, flattened lip, rather than a simple everted edge. *V. cyclophorella* is also usually a little larger. *V. albula* is similar in size and rib morphology; but generally has a distinct, thickened apertural lip. *V. perspectiva* is also similar; but generally distinctly smaller (2.0 mm diameter).

Ecology: This species is a hardy taxon, being found in dry rockpiles, *Artemisia* scrub, occasionally in Ponderosa pine forest, and open, shrubby areas with no tree canopy; and in grasslands. It need not be associated with seeps or springs; but can also tolerate considerable moisture. Strictly Nearctic and not known to have been introduced elsewhere.

General Distribution: *V. cyclophorella* seems especially characteristic of the Washingtonian and Rocky Mountain provinces. It also occurs in the Southwestern, here being "more boreal" that is, confined to northern Arizona counties and southern mountains at some elevation (Bequaert & Miller, 1973). It also occurs native sporadically in the Californian (Roth, 1997), being found both in southern California and in the extreme northeastern, Great Basin region. Farther north, it is mostly confined to the areas east of the Cascades crest, but occasionally crosses over slightly into the Oregonian.

Oregon Cascades sites noted by Branson & Branson (1984) were on the east side, in Lake and Klamath counties. We have found it in similar situations in the same areas. Branson (1977) reported a single site from the east side of the Olympic Peninsula: we have not found this taxon in western Washington. Branson (1980) found no Washington Cascades sites, east or west, making the Olympic Peninsula record even more remarkable. The taxon does occur rather commonly in eastern Washington. In the lower Salmon River valley, we found it at 14 of 213 sites, ranking it 13th out of a 60-taxon total (Frest & Johannes, 1995b).

Southwestern Oregon Distribution: Noted so far at a couple of sites in central and eastern Jackson County, in small-scale rock talus. More common in adjoining Klamath County, generally in rocky area, often rather open. No sites as yet on Pelican Butte.

Status: This species is still widespread in some of its original range, making special consideration unneeded as yet generally. In southeastern Oregon, it seems likely to remain very rare and local, perhaps justifying special consideration.

***Catinella (Mediappendix) vermeta* (Say, 1829)**
mudbank ambersnail

Discussion: Shell elongate, slender, width contained about 1 3/4 times in length; pale yellowish; surface irregularly wrinkled transversely; especially so on last whorl; often partly or wholly dirt-covered; spire high; adults with 3-3 1/4 whorls at height (length) of 10-11 mm; whorls strongly convex; aperture ovate, about 2/3 full shell length or less.

We follow Turgeon et al. (1998) in accepting this name for individuals commonly previously called *Catinella avara*. It should be noted here that several other succineids have been reported, more or less reliably, from either eastern Washington or eastern Oregon (east of the Cascades crest). Certain of these may occur here also: *Catinella (Mediappendix) gabbii* (Tryon, 1866); *Catinella (Mediappendix) rehderi* (Pilsbry, 1948); *Catinella (Mediappendix) stretchiana* (Bland, 1865); *Succinea oregonensis* Lea, 1841; *Succinea rusticana* Gould, 1846; *Oxyloma chasmodes* Pilsbry, 1948. We here follow the taxonomy of Roth (1997) and Turgeon *et al.* (1998).

Ecology: Often found along muddy stream banks or edges of lakes, ponds, marshes, and other perennially moist areas. Can be fairly resistant to drying; occurs in both shady and sunny areas.

General Distribution: Over much of North America, becoming more sporadic in the West. For eastern US distribution map, see Hubricht (1985). In the Western Division, this species has been ascribed to all of the provinces, *e.g.*, Bequaert & Miller (1973) for the Southwestern, under the name *Succinea (Novisuccinea) avara*. This taxon has likely been confused repeatedly with other succineids, so that re-identification should be considered.

Southwestern Oregon Distribution: Seems to be present in all counties; perhaps more common near the Coast and at low elevations generally. In Klamath County, found mostly near waters' edge in swamps, along Upper Klamath Lake, and in spring meadows. No sites as yet on Pelican Butte.

Status: This species seems to be surviving quite effectively in the Eastern US. Western sites are less common; but the local status needs additional evaluation.

Microphysula ingersolli ingersolli (Pilsbry, 1940)
spruce snail

Discussion: Shell whitish, semiglossy; discoidal, spire typically barely elevated; umbilicus prominent but shallow, about 1/4 full shell diameter; adult diameter about 4.0-4.4 mm at 5 1/2 whorls; aperture thin, narrowly lunate, slightly oblique; shell ornament very subdued; with faint growth lines and close, very shallow spiral striation on final whorls; whorls slowly and evenly increasing; suture deeply impressed.

This species somewhat resembles the Oregonian *M. cookei*; but the latter is smaller; has less numerous, rather slowly expanding whorls; and a less narrow, more evenly rounded aperture. *M. ingersolli* occurs mostly in rather xeric and open habitats, as contrasted with the coastal habitats of *M. cookei*. *M. ingersolli* also somewhat resembles *Hawaiia minuscula*; but the latter is smaller (generally about 2.1-25.5 mm diameter); has a slightly more elevated spire; thicker shell; larger umbilicus (about 1/3 full shell diameter) and even more convex whorls as seen from above, with a strongly impressed suture.

As illustrated in Pilsbry (1940, fig. 579g-i), Blue Mountains (Oregon) populations seem to be larger; have more numerous whorls; have a more elevated spire; and have a quite narrow umbilicus. It is possible that this form is a distinct taxon.

Not noted in Baxter (1987); nor in Branson (1977, 1980) or Branson & Branson (1984); but most of these were concerned with sites on the west side of the Cascades. It is possible that some ascriptions to *Hawaiia minuscula* in Baxter (1987) or Pilsbry (1948) refer to this taxon: see discussion under that species in Frest & Johannes (1999).

Ecology: Often associated with rocky ground, talus, or realtively open forest; frequent in semi-xeric sites and not necessarily associated with nearby water sources, such as springs. Found at a wide range of elevations.

General Distribution: Widespread in the Washingtonian Province, i.e., Idaho; eastern Washington; eastern Oregon; parts of Montana, Utah,Wyoming, and Colorado. Also frequent in the Southwestern Province (Bequaert & Miller, 1973), generally as the form *Microphysula ingersolli meridionalis*. Found also in Nevada and in parts of the Rocky Mountain Province, e.g. in Colorado and central Wyoming (Beetle, 1989). Oregonian sites are pretty rare; however, this taxon occurs in the upper North Umpqua River drainage ineastern Douglas County.

Southwestern Oregon distribution: See above. Relatively widespread in eastern Oregon, including the Blue Mountains, and in Klamath County. Note west Cascades slope occurrence cited above.

Status: Based on current knowledge, this taxon does not seem in need of special protection, except perhaps west of the Cascades crest.

TABLE 1. PELICAN BUTTE FAUNAL LISTS: TERRESTRIAL MOLLUSKS. EARLY 1998 SITES.

TAXON NAME	SITE NUMBER					
	25	26	27	28	29	30
Monadenia n. sp. 1*	-	-	-	-	x	-
Vespericola sierranus*	-	-	-	-	-	-
Vespericola n. sp. 14*	-	-	-	-	-	-
Prophysaon n. sp. 1*	-	-	-	-	x	-
Prophysaon andersoni	-	-	-	-	-	-
Deroceras laeve	-	-	-	-	-	-
Pristiloma arcticum crateris*	-	-	-	-	-	-
Pristiloma chersinella	-	-	-	-	-	-
Euconulus fulvus alaskensis	-	-	-	-	-	-
Zonitoides arboreus	-	-	-	-	-	-
Nesovitrea binneyana occidentalis	-	-	-	-	-	-
Nesovitrea electrina	-	-	-	-	-	-
Punctum randolphi	-	-	-	-	-	-
Paralaoma caputspinulae	-	-	-	-	-	-
Discus whitneyi	-	-	-	-	-	-
Columella "edentula"	-	-	-	-	-	-
Vertigo modesta modesta	-	-	-	-	-	-
Vitrina pellucida	-	-	-	-	-	-
Microphysula ingersolli	-	-	-	-	-	-
Vallonia cyclophorella	-	-	-	-	-	-
Catinella vermeta	-	-	-	-	-	-
SITE DIVERSITY	0	0	0	0	2	0

EXPLANATION: -=absent x= present live o=present: recently dead

For complete taxonomy, see text. Bold face= ROD taxon. *= recommended as ROD taxon (Forest Service/BLM Sensitive) by Frest & Johannes, in press. For sites, see APPENDIX A

TABLE 1. PELICAN BUTTE FAUNAL LISTS: TERRESTRIAL MOLLUSKS. LATER 1998.

TAXON NAME	SITE NUMBER													# occ.
	41	42	43	44	45	46	47	48	49	50	51	52	53	
Monadenia n. sp. 1*	x	x	x	o	o	x	o	x	o	o	x	o	o	14
Vespericola sierranus*	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Vespericola n. sp. 14*	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Prophysaon n. sp. 1*	T	x	-	x	x	x	x	x	-	x	x	x	x	12
Prophysaon andersoni	-	-	-	-	-	-	-	x	-	-	-	-	-	1
Deroceras laeve	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Pristiloma arcticum crateris*	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Pristiloma chersinella	x	x	x	x	x	x	x	x	-	x	x	x	x	12
Euconulus fulvus alaskensis	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Zonitoides arboreus	-	x	-	-	o	-	-	-	-	-	x	o	-	4
Nesovitrea binneyana occidentalis	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Nesovitrea electrina	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Punctum randolphi	-	o	x	-	-	-	-	-	-	x	-	-	-	3
Paralaoma caputspinulae	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Discus whitneyi	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Columella "edentula"	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Vertigo modesta modesta	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Vitrina pellucida	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Microphysula ingersolli	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Vallonia cyclophorella	-	-	-	-	-	-	-	-	-	-	-	-	-	0
Catinella vermeta	-	-	-	-	-	-	-	-	-	-	-	-	-	0
SITE DIVERSITY	3	5	4	4	4	4	3	4	1	4	3	4	3	

EXPLANATION: -=absent x= present live o=present: recently dead

For complete taxonomy, see text. Bold face= ROD taxon. *= recommended as ROD taxon (Forest Service/BLM Sensitive) by Frest & Johannes, in press

RESULTS

In late 1998, we surveyed some 19 terrestrial mollusk sites scattered over the east side of Pelican Butte. This was a subsample of a total of some 54 sites scattered over much of Winema National Forest. We found a total of 21 taxa on the Winema; of these, only a total of 7 occur on Pelican Butte. Diversity was on average quite low, about 4 taxa. We have thus far found no ROD mollusk taxa on Pelican Butte. However, certain of the taxa found are Winema endemics with narrow ranges and should be considered Sensitive taxa. Forest-wide, these are *Monadenia (Monadenia)* n. sp. 1; *Vespericola* n. sp. 14; and *Prophysaon* n. sp. 1. Of these, two (the *Monadenia* and the *Prophysaon*) do occur on Pelican Butte. Certain ROD taxa believed to occur on Winema National Forest lands probably do not occur and so far are not found on Pelican Butte. These are *Prophysaon coeruleum* and *Prophysaon dubium*. Two other ROD taxa, *Vespericola sierranus* and *Pristiloma arcticum? crateris*, definitely occur in this area (elsewhere on the Winema and near Crater Lake) but do not appear to be found on Pelican Butte.

Land snails and slugs are rather low in overall diversity in Winema National Forest but of unusual biogeographic interest. This is because the standard dominants in most of the Oregonian molluscan Province, *Monadenia (Monadenia) fidelis fidelis*, *Vespericola columbianus*, and *Pristiloma lansingi* are here replaced by local endemics. Normally, this area would be regarded as part of the Washingtonian molluscan Province (see Frest & Johannes, 1999, for map and discussion). But the terrestrial mollusk fauna here is of mixed affinities, with the two dominant genera, *Monadenia* and *Vespericola*, of Oregonian rather than Washingtonian affinities, while the rest of the fauna reflects typical Washingtonian affinities. Thus, the area with *Prophysaon* n. sp. 1, *Monadenia (Monadenia)* n. sp. 1, and *Vespericola* n. sp. 14 constitutes a distinct endemic cluster of quite limited geographic extent. Quite likely, other narrow endemics will be found with more thorough search. Note that the freshwater mollusk fauna is also thought to constitute an independent biographic unit, with at least 21 strict and perhaps 27-29 total endemics. The Great Basin influence evident in the freshwater fauna (Frest & Johannes, 1998a,b; 1999a) is not evident among the terrestrial forms.

GLOSSARY

[For other terms, see Arnold (1965)]

adnate (adj.) Barely attached to or in contact with; refers generally to contact of last whorl with preceding one. See **appressed**.

alate (adj.) Wing-shaped.

amnicole (n., adj.) Organism living only in or preferring stream environments; stream dweller.

amniphile (n.) Preferring stream environments; river-dweller by preference; **amniphilic** is the adjective.

angular, **angulate** (adj.) Having an angle (or having the tendency to form an angle), rather than a round contour.

appressed (adj.) Well-attached to or clearly in contact with; refers generally to contact of last whorl with preceding one. See **adnate**.

aperture (n.) The opening of a snail shell, through which the body protrudes when the snail is active (Burch & Pearce, 1990, fig. 9.3).

atrium (n.) The portion of the lower reproductive tract in pulmonate land mollusks situated between the external genital pore (*q.v.*) and the junction of the penis and vagina (Burch & Pearce, 1990, fig. 9.3).

aufwuchs (n.) The organic coating on stones or other underwater surfaces in permanent water bodies; consists of diatoms, protozoans, small algal epiphytes; fungi; and bacteria. The major food resource for lithophile taxa, and for **perilithon** and **periphyton** feeders (*q.v.*).

basal (adj., n.) That part of shell peristome opposite the apex; a tooth or lamella located in that portion of the shell aperture. As regards the natural life position, the base is the anterior end. When held with the apex directed upward, the base is the bottom of the shell.

basal crescent (n.) Depressed area of, or immediately adjacent to, columella, often crescent-or wedge-shaped, generally with closely spaced prominent growth lines or striae. Used in regard to shells of Hydrobiidae and related freshwater snail families.

bipectinate (adj.) Branched on two sides in a plane; feather-like; refers to gill filaments of **pseudobranch** (*q.v.*) in certain freshwater snail groups.

bipectinate gill (n.) Feather-like true gill or **pseudobranch** (q.v.) of some freshwater snails.

broadly conic (adj.) Shell conic, as wide or wider than high.

calciphile (n.) A species requiring relatively large amounts of free calcium ions for its shell or for other physiology- or metabolism-related reasons; used here for certain land snail and slug species; there are calciphile plants as well.

caudal horn (n.) Small, horn-shaped projection or protuberance at posterior end of snail, above mucus pore or anal opening (anus).

cephalic tentacle (n.) Either of the pair of elongate, flexible organs on the top of the head (base of the snout) of certain freshwater snails; generally with an eye near the lateral base, borne on a more or less distinct lobe.

collabral (adj.) Parallel to the lip of a snail shell. Refers to shell sculpture such as ridges, growth lines, or ribs. Sometimes the alternative "transverse" is used (Burch & Pearce, 1990, fig. 9.3). Another commonly seen older synonym is the term "axial".

columella (n.) The internal column around which the whorls revolve; the axis of a spiral shell; especially the exposed expression of this structure on the last whorl. The adjective is **columellar**.

compressed (adj.) Appearing flattened; relatively plane as opposed to convex: applied to shell whorls, the body whorl specifically, or the shell base.

concentric (adj.) Having bands, lines, or the like disposed in even increments around the same center of origin; refers to operculum morphology.

conic, conical (adj.) Said of a shell having approximately the shape of a cone, *i.e.*, tapering evenly from a wide, circular base to a point.

crenocole (n., adj.) Obligate spring dwelling or dweller.

crenophile (n., adj.) Preferring to live in springs; snail with such a preference; **crenophilic** is the adjective.

crenulated (adj.) Notched or scalloped in outlined.

crescentic (adj.) Having the shape of a crescent moon; applied to aperture or lamellar shape.

crest (n.) In pupillid and other land snails, a thickened area of the shell immediately or closely behind the shell aperture.

crustose (adj.) Having a crust of irregular, granular deposits of shell material; refers more specifically to the margin of the mature shell lip in some Haplotrematidae (*e.g.*, *Haplotrema voyanum*).

deflected (adj.) Bent downward from the preceding growth trajectory; most often refers to the final portion of the last whorl of some snail shells.

depressed (adj.) Flattened dorso-ventrally (from apex to base); see Burch & Pearce, 1990, fig. 9.5d; often used in combination with other adjectives describing shell shape (see next entry).

depressed conic (adj.) Conic shell depressed dorso-ventrally or postero-anteriorily; more specifically, with an apical angle of about 100° (see Burch, 1989, fig. 5e).

detritivore (n.) Aqueous taxon feeding on organic particles in sediment.

disjunct (adj.) Refers to whorls or portion of shell not in contact with preceding whorls (portion of shell); detached; loosely coiled shell, wholly or in part, with the whorls not touching one another.

edaphic (adj.) Pertaining to soil conditions, such as composition, pH, zone, etc.

elongate conic (adj.) Conic spire with an apical angle of about 30° (see Burch, 1989, figs. 4a, 5b).

epiphallic caecum (n.) A slender, more or less elongate, blind sac borne on the **epiphallus** (*q.v.*) in some pulmonate snails. Also sometimes called "flagellum" (Burch & Pearce, 1990, fig. 9.194a, b).

epiphallus (n.) In many pulmonate land mollusks, the portion of the male reproductive between the vas deferens and the penis (Burch & Pearce, 1990, figs. 182b, 9.184a); not everted in copulation.

epiphyte (n.) A (small) organism living attached to a (larger) substrate particle or other organism; **epiphytic** is the adjective.

eucrenic (adj.) Well-watered; having large numbers of springs and streams.

eurythermal (adj.) Preferring or adapted to a broad temperature range, in contrast to **stenothermal** (*q.v.*).

excentric (adj.) Not placed in the center; refers most often to the nucleus of an operculum.

external genital pore (n.) The hole by which the reproductive system reaches the exterior of the animal. In many pulmonate land mollusks it is located on the right side of the body, posterior to and slightly below the right **ocular tentacle** (*q.v.*).

genotype (n.) Formally designated type species of a genus-level taxon.

globose (adj.) Shaped like a sphere, *i.e.* with equal width and height and broadly rounded sides (see Burch, 1989, fig. 4c).

globosely conic (adj.) Conic spire with an apical angle of about 70° (see Burch, 1989, fig. 5d).

heliciform (adj.) See **helicoid**.

helicoid (adj.) Shaped like a *Helix*; refers to shell shape; in the form of a low, three-dimensional spiral, with somewhat depressed spire and whorls regularly increasing in diameter (Burch & Pearce, 1990, fig. 9.6a).

helocrene (n.) Spring in a marsh; often an opening with colder water in a more extensive, warmer *Typhus*- or *Scirpus*-covered marsh.

holotype (n.) Formally designated type specimen for a species-level taxon, as established at the time of the original description or by valid subsequent action.

homoiothermophile (n.) Preferring or adapted to a relatively even or unchanging temperature regime: see **poikilothermophile** (*q.v.*).

hypsiphile (n.) Taxon restricted to or liking high elevations: refers to certain land and freshwater mollusk taxa; **hypsiphilic** is the adjective.

imperforate (adj.) Having no umbilicus, either due to appression of inner whorls along the shell axis, leaving no central axial cavity; or having such a cavity but in adult shells with a callus or reflected columellar lip completely covering the opening (Burch & Pearce, 1990, fig. 9.10a).

inflated (adj.) Appearing swollen; strongly convex as opposed to flattened; applied to shell whorls generally, the body whorl in particular; or the shell base.

insolation (n.) The amount of sunlight striking the ground.

lamella (n.) [pl. **lamellae**] A calcareous plate, blade, tooth, or scale-like structure on a snail shell; most often refers to such structures located in the shell aperture (Burch & Pearce, 1990, fig. 9.49), particularly those occurring on the parietal (q.v.) and columellar or basal apertural sides, those on the outer (or palatal) sides being termed "folds" or "plicae" (Burch & Pearce, 1990, fig. 9.47, 9.49). In the Pupillidae and similar families, the lamellae (or teeth) or termed parietal or angular, subangular; columellar; basal; and palatal(s) respectively (Pilsbry, 1948, fig. 469; Burch, 1962, fig. 83).

lamellar (adj.) Acutely rounded as opposed to broadly rounded; plate-, blade-, or scale-like; generally applied to ribs, lirae, or other shell sculptural structures.

lappet (n.) A fold, small flap, lobe, or loose hanging portion; generally applied to the lip of a shell.

lectotype (n.) A subsequently designated holotype.

lentic (adj.) Living in standing water, especially a lake or pond.

lenticular (adj.) Having the shape, in lateral view, of the cross-section of a convex lens, *i.e.*, broadly convex above and below and angulate at the sides (Burch & Pearce, 1990, fig. 9.169c).

limnetic (adj.) Of or pertaining to lakes; living in lakes.

limnocole (n.) Organism restricted to or preferring lake environments; lake dweller.

limnocrene (n.) Spring pool, with or without outlet; generally used for rather large pools.

limnophile (n.) Preferring lake environments; **limnophilic** is the adjective.

lineolate (adj.) Marked with minute lines.

lirate (adj.) Ornamented with sharp, raised threads, marked with parallel grooves or ridges; having thread-like sculpture (**lira**, pl. **lirae**).

lotic (adj.) Living in flowing water, particularly a permanent stream or spring run.

maculate (adj.) Having irregular-shaped spots of contrasting color.

madicolous (adj.) Occurring on the wetted perimeter of a water body, but not in it: amphibious.

malleation (n.) A shell surface sculpture in which the shell bears numerous small, rounded dents, *e.g.*, as in hammered aluminum ware. Individual malleations may be sparsely to densely distributed.

mantle (n.) A fleshy tunic; a membranous covering of a mollusk that secretes the shell from marginal glands and provides the periostracum; pallium.

meatus (n.) The opening of a duct, especially the opening of the seminal duct in the verge (*q.v.*), which may be either terminal or slightly subterminal in position.

mesic (adj.) Having moderate amounts of available water or moisture; as many shaded, forest habitats; compare **xeric** and **notic** (*q.v.*)

mesophile (n.) A species tolerant of or requiring relatively moist [but not extremely moist] conditions for at least part of its life, such as occur in forests or other areas shielded from continual insolation. The adjective is **mesophilic**.

metasedimentary (adj.) Rock type of difficult to characterize lithology derived from the metamorphosis of a sedimentary unit.

monospecific (adj.) Single species; used in three senses: 1) a genus with but one species; 2) a species assemblage or community with but one species; 3) a genus (genera) with one species present in a given assemblage or community.

monotypic (adj. Having a single species-level taxon; generally applied to a genus.

mucronate (adj.) Terminating abruptly in a short sharp point or spine.

mucus bulbs (n.) Paired, bulbous swellings on the two mucus gland ducts that lead from the dart sac to the mucus glands in the family Helminthoglyptidae (Roth, 1988a, fig. 7; Burch & Pearce, 1990, fig. 9.326b [but labeled as "mucus gland bulbs"]).

multispiral (adj.) Refers to an **operculum** (*q.v.*) in which there are numerous, very slowly enlarging whorls, spirals, or coils. Compare **paucispiral**; **concentric**; **excentric** (q.v.).

nasmode (n.) A set of nearby, generally large springs deriving from a common source; spring complex; spring family.

nasmodic (adj.) Having large numbers of springs.

neanic (adj.) Those whorls of a snail shell that develop after the snail hatches from its egg; post-embryonic whorls. Embryonic and neanic whorls often differ conspicuously in sculpture (*e.g.*, Burch & Pearce, 1990, fig. 9.44).

neotype (n.) Holotype designated later to replace a lost holotype.

neritiform (adj.) Shaped like *Nerita*; *i.e.* subglobose or hemispherical, with few, rapidly enlarging whorls, very reduced spire, and a heavily callused and expanded parietal apertural margin.

node (n.) A knob or swelling; generally on the outside shell surface or aperture periphery.

nomen dubium [pl. ***nomina dubia***] (n.) A species-level name of questionable validity.

nomen nudum [pl. ***nomina nuda***] (n.) A name first published without adequate description or otherwise defective according to ICZN rules.

notic (adj.) Relatively moist; with much available free water; as habitats around swamps, marshes, lakes, or other permanent waters. Compare **xeric** and **mesic** (q.v.).

notophile (n.) A species tolerant of or requiring very moist conditions for at least part of its life, such as occur alongside permanent streams, seeps or springs; used here for certain land snail and slug species. The adjective is **notophilic**.

ocular tentacle (n.) Either of the upper pair of the two pairs of elongated, flexible organs on the head of certain snails and slugs, bearing an eye at the tip; other equivalent terms are "superior tentacle" , "ommatophore', or "eyestalk"; compare **cephalic tentacle** (*q.v.*).

operculum (n.) A horny (corneous) or calcareous plate borne on the posterior foot of the prosobranch freshwater and certain land snails, which closes the aperture when the snail withdraws into its shell.

palatal (adj., n.) Outer lip or tooth or lamella in this area; that portion of the lip between the parietal wall and the basal lip; term used particularly for pupillid and related land snails.

pallial tentacle (n.) Simple tubular-shaped projection or fleshy process produced by the mantle in certain mollusk groups (*e.g.*, the Valvatidae), possibly either respiratory or sensory in function.

paralectotype (n.) A subsequently designated paratype.

paratype (n.) All members of the type suite for a species-level taxon, other than the holotype.

parietal (adj.) Pertaining to the inside wall of the shell aperture, *i.e.*, that portion in contact with the preceding whorl ; that part of the shell aperture formed over or representing the outer wall of the preceding whorl (Burch & Pearce, 1990, fig. 9.3). A lamella developed on this wall is called a **parietal lamella**: also termed **parietal tooth**.

paucispiral (adj.) Refers to an **operculum** (q.v.) with relatively few whorls, spirals, or coils.

pelophile (n.) Preferring muddy environments; **pelophilic** is the adjective.

perforate (adj.) Having a narrow but distinct umbilicus; compare **rimate**.

perilithon (n.) Those organisms growing on stones; usually refers to the smaller (near to microscopic, and consisting of just one or a few cells per individual) and inconspicuous epiphytic algae, diatoms, protozoans, bacteria and fungi, rather than to larger organisms or plants; **aufwuchs** (q.v.), in part.

periostracum (n.) The thin, proteinaceous outer shell layer, most likely to be pigmented.

periphery (n.) The edge of the shell as seen in outline view (see Burch & Pearce, 1990, fig. 9.7); there are specialized terms for several commonly-seen periphery shapes.

periphyton (n.) Those organisms growing on submerged stems and other parts of aquatic macrophytes; usually refers to the smaller (near to microscopic, and consisting of just one or a few cells per individual) and inconspicuous epiphytic algae, diatoms, protozoans, bacteria and fungi, rather than to larger organisms or plants; **aufwuchs**, in part.

peristome (n.) The thickened rim or lip around the mouth; the lip or margin of the aperture of a spiral shell. The part of the shell surrounding the **aperture** (*q.v.*).

phreatic (adj.) Of or pertaining to groundwater crevices; living in underground waters.

pilaster (n.) A fleshy ridge, especially oriented longitudinally, within the penis.

plication (n.) Small fold or corrugation that affects the whole shell but does not thicken it.

pneumostome (n.) The opening to the pulmonary cavity, specifically in pulmonate snails.

poikilothermophile (n.) Tolerant of or adapted to a relatively varied temperature regime; as contrasted to **homoiothermophile** (*q.v.*).

potamon (n.) The downstream portions (lower reaches)of a river system, often characterized by considerable yearly temperature fluctuations, more variable and lower dissolved oxygen, less coarse substrates, and weaker bottom currents. See **rhithron** (*q.v.*) also.

protoconch (n.) That portion of the shell of a freshwater snails that is developed in the egg, prior to hatching; also termed embryonic whorls. Ornament and other morphological features of this portion of the shell often differ from those of later (post-embryonic) whorls (**teleoconch** or **neanic** (*q.v.*) whorls).

pseudobranch (n.) A false or secondarily-derived gill; a vascularized fleshy outgrowth near the opening of the pulmonary cavity (**pneumostome**) of aquatic pulmonate snails, which aids in respiration. Not a true ctenidium.

pupilliform (adj.) Shaped like a small pupa or cocoon; refers to a common shell form in the Pupillidae and families with similar shell morphology.

regolith (n.) The parent rock from which the soil in an area is derived; or that lithology most influencing edaphic conditions.

reflected (adj.) Turned back; refers to edge of **peristome** (*q.v.*) or lip.

retractive (adj.) Oriented opposite of the direction of coiling.

revolute (adj.) Rolled back; refers to edge of **peristome** (*q.v.*).

rheocrene (n.) A flowing spring or spring run.

rhithron (n.) The upstream (headwaters) portions of a river system, often characterized by comparatively high dissolved oxygen concentrations, comparatively low temperatures with less yearly fluctuations, coarse substrates, and strong currents. Contrast with **potamon** (*q.v.*).

rimate (adj.) Having a very narrowly perforate umbilicus; barely umbilicate.

rugae (n., pl.: singular **ruga**, seldom seen) Convex, usually **collabral** (*q.v.*) undulations of the shell surface, roughening it but not as prominently as do ribs. **Rugae** in cross section appear as outward shell undulations, rather than actual thickenings (ribs, lirae (*q.v.*)).

rugate (adj.) having a rough or rough-appearing surface.

s.l. (adv.) Abbreviation for *sensu late* [Latin], in the broad sense; loosely speaking.

s.s. (adv.) Abbreviation for *sensu stricto* [Latin], in the strict sense; strictly speaking.

sinulus (n.) A dent or invagination in the palatal wall of the aperture; used especially for pupillids.

solid (adj.) Firm, substantial, as opposed to delicate or thin; said of shell thickness or aspect.

spiral (adj.) Coiling around a central axis; coiled around a central point and continually receding from it, with or without concomitant lateral translation; applied to shell form generally, and also to shell sculptural features such as ribs or striae; as opposed to "**collabral**" (*q.v.*) or "transverse"

spire (n.) The whole series of whorls of a spiral shell, excepting the last.

stenothermal (adj.) Preferring or adapted to a narrow temperature range. Contrast **eurythermal** (*q.v.*).

striae (n., pleural; singular **stria** [rare]) A narrow superficial groove or fine furrow on the outer shell surface (Burch & Pearce, 1990, fig. 9.13). Properly refers to negative features only, although sometimes mistakenly used for positive sculptural features, such as fine lirae or ribs, raised above the shell surface.

subangulate, **subangular** (adj.) Refers to a shell **periphery** (*q.v.*) in which the conjunction of the top and bottom [=upper and lower] shell surfaces as seen in profile [=side] view is a rounded angle

sulcus (n.) A relatively broad, shallow furrow on a shell surface.

suture (n.) The line of junction or seam along which two hard structures join; a continuous spiral line marking the junction of whorls in a gastropod shell.

thermicole (n., adj.) (Organism) living only in or preferring warm spring environments.

thermiphile (n.) Preferring warm spring environments; **thermiphilic** is the adjective.

tumid (adj.) Swollen in appearance; broad as contrasted to slender; used in reference to shell whorls generally, the body whorl in particular; or the shell base.

umbilicus (n.) An indentation or cavity or a circular depression at the axial base of a spiral shell; the hollow formed in spiral shells when the inner side of the volutions do not join; the central opening or cavity along the axis of the shell when the inner whorl sides are not appressed (see Burch & Pearce, 1990, fig. 9.3). The adjective is **umbilicate**; other terms describe relative size or proportions more specifically, *e.g.* **rimate**, **perforate**, etc.

varix (n.) A **collabral** (*q.v.*: transverse) thickening of the inner or outer wall of a shell. The term is generally limited to a structure that occurs once or a few times during shell growth, as contrasted to regular, closely repeated ribs or striae; often, the term is limited further to rather coarse or large-scale thickenings.

verge (n.) 1) In freshwater snails, particularly Hydrobiidae, the external expression of the male genital system, consisting of a penis (with vas deferens) and sometimes of various other associated lobes, ducts, glands, or some combination; 2) in certain land snails, a protuberant copulatory structure at the summit of the penis, ranging from a short, stubby process to an elongate, finger-like structure. The seminal duct is enclosed within it, with the opening (**meatus**, *q.v.*) either terminal or subterminal.

xeric (adj.) Relatively dry; with relatively little available moisture; as, desert or semidesert areas: compare **mesic** and **notic** (q.v.).

xerophile (n.) A species tolerant of or requiring relatively dry (arid or semiarid) conditions for at least part of its life; used here for certain land snail and slug species. The adjective is **xerophilic**.

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APPENDIX A. SITES.

Map coordinates are from the latest available USGS 7.5' series topographic maps. Legal coordinates are given when practical; where survey is irregular, projected coordinates are given, orienting from the northwest section corner wherever possible. UTM coordinates are also supplied, in the format favored by Crawford (1983). Road names, road numbers and land ownership were confirmed using DeLorme Mapping's Oregon Atlas and Gazetteer, Winema National Forest Road Atlas, Winema National Forest 1986 1:126,720 map, and other maps supplied to us by Winema National Forest. Site descriptions are a partial dump from Deixis MolluskDB™. For locations, see site map (Figure 1).

Site entry format: Project site number, Deixis locality number [in brackets], locality name, coordinates (UTM; legal), quadrangle (name and year), county, drainage, mountain range, valley, geographic description, elevation, depth, habitat description, locality remarks, collector remarks, date collected, and collectors.

Collector abbreviations as follows:

TF= Terrence J. Frest
EJ= Edward J. Johannes

25. [3675] North 1.0 mile from Malone Spring. Zone 10: 575,020E 4,710,300N. E1/2 NW1/4 NE1/4 SW1/4 NW1/4 sec. 11, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Crystal Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. Both sides of FS3450 (abandoned) about 0.1 mi. off Westside Road (FS34, Klamath Co. 531), 1.0 mi. N. of Malone Spring, Winema National Forest. Elev. 4160'. Mix of *Pseudotsuga menziesii* and *Pinus ponderosa* forest; almost level riparian forest with a grassy understory. Rather dry. No mollusks. 6/25/1998 TF, EJ!

26. [3676] North 0.95 mile from Malone Spring. Zone 10: 575,100E 4,710,200N. NE1/4 SE1/4 NE1/4 SW1/4 NW1/4 sec. 11, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Crystal Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. E. side of FS3459 and W. of Upper Klamath Lake, about 0.2 mi. E. from Westside Road (FS34, Klamath Co. 531), 0.9 mi. N. of Malone Spring, Winema National Forest. Elev. 4155'. Bank of marsh with common *Salix*, small *Populus*, *Pseudotsuga menziesii*, and *Pinus ponderosa*. *Deroceras* only. 6/25/1998 TF, EJ!

27. [3677] South 0.2 mile from Malone Spring. Zone 10: 575,215E 4,708,530N. NE1/4 NW1/4 SW1/4 SE1/4 NW1/4 sec. 14, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Crystal Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. Area around small inlet of Crystal Creek, S. 0.2 mi. from Malone Spring. Elev. 4150'. Forest with mostly *Pseudotsuga menziesii* and *Pinus ponderosa*. No mollusks. 6/25/1998 TF, EJ!

28. [3678] South 0.15 mile from Malone Spring. Zone 10: 575,180E 4,708,600N. SW1/4 NW1/4 SE1/4 NW1/4 sec. 14, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Crystal Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. E. side of FS34-290 (access road to Malone Spring), about 0.15 mi. S. of Malone Spring along abandoned access road. Elev. 4160'. Forest with mostly *Pseudotsuga menziesii* and *Pinus ponderosa*. No mollusks. 6/25/1998 TF, EJ!

29. [3679] South 2.0 miles from Malone Spring. Zone 10: 575,300E 4,705,500N. NW1/4 NE1/4 NW1/4 SE1/4 NW1/4 sec. 26, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Recreation Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. S. side of FS34-230 about 0.05 mi. W. of Westside Road (FS34, Klamath Co. 531), Winema National Forest. Elev. 4340-4360'. *Pseudotsuga menziesii* with some *Pinus ponderosa*; fairly mature trees; low diversity understory; some woody debris. 1 *Monadenia* n. sp. juvenile and *Prophysaon* n. sp. (Klamath tail-dropper). 6/25/1998 TF, EJ!

30. [3680] South 0.5 mile from Malone Spring. Zone 10: 575,120E 4,708,060N. SE1/4 NE1/4 SE1/4 NW1/4 SW1/4 sec. 14, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Crystal Cr.-Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Wood River Valley. N. side of FS34-300, just W. of Westside Road (FS34, Klamath Co. 531), Winema National Forest. Elev. 4300-4320'. Mostly *Pseudotsuga menziesii* with some *Pinus ponderosa* and *Salix*. No mollusks. 6/25/1998 TF, EJ!

41. [3885] Pelican Butte 1. Zone 10: 574,720E 4,710,670N. SW¼ NW¼ NW¼ NW¼ NW¼ sec. 11, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.2 rd. mi. W. of FS34 (Westside Road, Klamath Co. 531) on FS34-382 (N. side), E. side of Pelican Butte S. of Rock Creek, Winema National Forest. Elev. 4220'. *Pseudotsuga menziesii* with common *Chimaphila*; rare *Pyrola*; second-growth; common downed wood. *Monadenia* n. sp. and *Pristiloma chersinella*. Slug trails present under bark and rocks (basalt). 10/20/1998 TF, EJ!

42. [3886] Pelican Butte 2. Zone 10: 574,200E 4,709,860N. NW¼ NE¼ NW¼ SE¼ sec. 10, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. On NE side of FS34-350 about 0.65 rd. mi. W. of FS34 (Westside Road, Klamath Co. 531), E. side of Pelican Butte, Winema National Forest. Elev. 4500-4540'. *Pseudotsuga menziesii* and

Picea forest; scattered basalt taluses. *Monadenia* n. sp., *Pristiloma*, and possibly *Punctum*. *Prophysaon* and *Monadenia* slime and excrement present on undersides of rocks a in basalt talus. 10/20/1998 TF, EJ!

43. [3887] Pelican Butte 3. Zone 10: 573,070E 4,709,080N. NE¼ NE¼ NE¼ NE¼ sec. 16, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. On E. side of FS3456 about 1.2 rd. mi. N. of FS34-238 junction, E. side of Pelican Butte, Winema National Forest. Elev. 5640-5740'. Mixed forest of *Pseudotsuga menziesii*, *Abies concolor*, and *Pinus lambertiana*. Basalt talus above road; duff covered talus below road; uncommon downed wood. Understory very sparse (some *Salix* present). *Monadenia* n. sp. (1 live); *Microphysula*; *Pristiloma*; *Punctum*. Litter sample collected. 10/23/1998 TF, EJ!

44. [3888] Pelican Butte 4. Zone 10: 573,200E 4,708,240N. NW¼ NW¼ NW¼ SW¼ sec. 15, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.7 rd. mi. N. of FS34-238 on FS3456 (both sides), E. side of Pelican Butte, Winema National Forest. Elev. 5560-5640'. *Pseudotsuga menziesii* and *Abies concolor*, large basalt talus on one side of site (S. side). Understory with abundant *Chrysolepis chrysophylla*, dwarf *Arctostaphylos and Chimaphila umbellata*. . *Monadenia* n. sp. (dead only; found in talus); *Microphysula*; *Pristiloma*. *Prophysaon* slime trails and excrement noted from under rocks in talus. 10/23/1998 TF, EJ!

45. [3889] Pelican Butte 5. Zone 10: 573,640E 4,707,460N. NW¼ NE¼ & NW¼ NE¼ of NW¼ NE¼ NW¼ sec. 22, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.2 rd. mi. N. of FS34-238 junction on E. side of FS3456, E. side of Pelican Butte, Winema National Forest. Elev. 5400-5460'. Mix of *Pseudotsuga menziesii* and *Pinus lambertiana*. Fairly open area; evidence of a forest fire. Understory of *Goodyeara oblongifolia*, *Chimaphila umbellata*, *Chrysolepis*, and *Arctostaphylos*. Talus present locally. *Monadenia* n. sp. (all dead); *Pristiloma*; *Zonitoides*; *Prophysaon* n. sp. (Klamath tail-dropper). 10/23/1998 TF, EJ!

46. [3907] Pelican Butte 6. Zone 10: 573,020E 4,705,940N. SE¼ SW¼ SW/4 SW¼ SE¼ sec. 22, T35S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.3 rd. mi. S. of FS34-236 junction on E. side of FS3456, E. side of Pelican Butte, Winema National Forest. Elev. 5180-5200'. *Pseudotsuga menziesii*, *Pinus ponderosa*, and *Pinus lambertiana*. Understory of *Prunus virginiana*, *Chimaphila umbellata*, *Chrysolepis*, and some *Arctostaphylos*. Rather open (recent thinning). *Monadenia* n. sp. (1 live juvenile); *Prophysaon* n. sp. (Klamath tail-dropper), *Pristiloma*. Snails from vicinity of old-growth logs only (under bark from these logs). 10/23/1998 TF, EJ!

47. [3908] Pelican Butte 7. Zone 10: 574,440E 4,705,060N. NW¼ NW¼ NW/4 NE¼ SE¼ sec. 27, T36S R6E, Pelican Bay 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.6 rd. mi. N. of FS3456-240 junction on E. side of FS3456, E. side of Pelican Butte, 1.5 mi. N. of Rock Point Resort, Winema National Forest. Elev. 4940-4980'. Mostly *Pseudotsuga menziesii* with a few large *Pinus ponderosa*. Understory of *Chimaphila umbellata* and *Arctostaphylos*. *Monadenia* n. sp. (dead only); *Pristiloma*; *Prophysaon* n. sp. (Klamath tail-dropper). 10/23/1998 TF, EJ!

48. [3909] Pelican Butte 8. Zone 10: 573,300E 4,709,700N. Center NW¼ SW¼ sec. 10, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. At terminus of FS34-300 on E. side, about 0.8 rd. mi. N. of FS34-230, E. side of Pelican Butte, Winema National Forest. Elev. 5280-5320'. *Pseudotsuga menziesii*, *Pinus ponderosa*, rare *Pinus lambertiana*, cedar, and *Abies magnifica*. Some *Chimaphila umbellata*, *Prunus virginiana*, *Chrysolepis chrysophylla*, *Goodyeara oblongifolia* and *Pteropora*. *Monadenia* n. sp. (1 live); *Prophysaon*; *Pristiloma*; 1 *Punctum*. Slugs and snails found mostly under bark. 10/24/1998 TF, EJ!

49. [3910] Pelican Butte 9. Zone 10: 573,840E 4,709,200N. S½ SE¼ SE¼ SW¼ sec. 10, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R.,

Cascade Range. About 0.3 rd. mi. N. of FS34-230 on both sides of FS34-300, E. side of Pelican Butte, Winema National Forest. Elev. 5000-5040'. *Pseudotsuga menziesii*, some *Pinus ponderosa* and *Pinus lambertiana*. Understory sparse. Mostly *Chrysolepis chrysophylla*, *Prunus virginiana*, and *Arctostaphylos*. Extensive andesite outcrops and rock piles with bryophytes, *Pellaea*, *Cystopteris*, uncommon *Draba*; rare *Cornus canadensis*. Evidence of a very old fire. *Monadenia* slime trails and excrement. 10/24/1998 TF, EJ!

50. [3911] Pelican Butte 11. Zone 10: 573,860E 4,708,340N. SW¼ SE¼ SE¼ SE¼ NW¼ sec. 15, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. N. side of FS34-230 about 0.35 rd. mi. S. of FS34-300 junction, E. side of Pelican Butte, Winema National Forest. Elev. 4980-5000'. *Pseudotsuga menziesii* forest with major andesite talus through it; talus moss covered. Understory sparse with *Cornus canadensis* and *Chimaphila umbellata*. 1 long dead *Monadenia* n. sp. (evidence of *Monadenia* slime trails and excrement); *Pristiloma*; *Punctum*; *Prophysaon* n. sp. (Klamath tail-dropper). 10/24/1998 TF, EJ!

51. [3912] Pelican Butte 11. Zone 10: 573,780E 4,709,940N. SE¼ SW¼ SE¼ SE¼ NW¼ sec. 10, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. W. side of FS34-302 about 0.1 rd. mi. S. of FS34-304 junction, E. side of Pelican Butte, Winema National Forest. Elev. 4780-4800'. *Pseudotsuga menziesii* forest with some *Pinus ponderosa* and very rare cedars. Understory of grasses, *Prunus virginiana*, with minor *Arctostaphylos* and *Chrysolepis chrysophylla*. *Monadenia* n. sp. (2 live, 3 dead), *Pristiloma*, *Prophysaon* n. sp. (Klamath tail-dropper), long-dead *Microphysula*. *Monadenia* and *Prophysaon* mostly from under bark. 10/24/1998 TF, EJ!

52. [3913] Pelican Butte 12. Zone 10: 574,245E 4,709,300N. NW¼ NE¼ SE¼ SW¼ SE¼ sec. 10, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. Both sides of FS34-302 about 0.6 rd. mi. N. of FS34-304 junction, E. side of Pelican Butte, Winema National Forest. Elev. 4580-4640'. *Pseudotsuga menziesii/Pinus ponderosa* forest with some cedars. Understory of bracken fern; common *Cornus canadensis* and *Prunus virginiana*. *Monadenia* n. sp. (recent dead), *Zonitoides*, and *Prophysaon* n. sp. (Klamath tail-dropper). 10/24/1998 TF, EJ!

53. [3914] Pelican Butte 13. Zone 10: 574,500E 4,708,560N. NE¼ NE¼ SW¼ & SE¼ SE¼ NW¼ of SE¼ NE¼ sec. 15, T36S R6E, Crystal Spring 1985 quad., Klamath Co., Oregon. Upper Klamath Lk.-Link R.-Lk. Ewauna-Klamath R., Cascade Range. About 0.5 rd. mi. N. on FS34-302 form FS34-304 junction, E. side of Pelican Butte, Winema National Forest. Elev. 4500-4540'. *Pseudotsuga menziesii*, some *Pinus ponderosa*, little bit of cedar and *Abies*. *Prophysaon* n. sp. (Klamath tail-dropper), *Pristiloma*, and traces of *Monadenia* n. sp. (slime trails and excrement) on bark. 10/24/1998 TF, EJ!

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